THE BRITISH JOURNAL

OF

TUBERCULOSIS

Vol. VIII. October, 1914. No. 4.

ORIGINAL ARTICLES.

THE MILK-SUPPLY AS A CAUSAL FACTOR IN RELATION TO TUBERCULOSIS.[1]

By SHERIDAN DELÉPINE,

M.B., CM., M.SC.,

Professor of Public Health and Bacteriology in the University of Manchester, and Director of the Public Health Laboratory.

It was chiefly the experimental, pathological, and clinical evidence available at the time that induced me in 1891 to devote my attention to the means of reducing the amount of tuberculous milk forming an important part of our milk-supplies, and since 1896 I have been able to collect, in connection with the administrative work carried out in Manchester and elsewhere, the information which I now propose to lay before you. One of the effects of the work is shown in the accompanying tables.

The relapse observable since 1910 is not easy to explain. It is not special to the farms supplying Manchester, but it is part of a phenomenon affecting a large part of the country. It may be due to certain circumstances which have lately affected the movements of cattle, or to some change occurring over large areas, and causing a reduction of the resistance of cattle to infection, or an increased virulence of the bacillus. This recrudescence in the number of tuberculous samples does not, however, indicate a very material relapse. The

[1] Excerpt from a paper read at the Congress of the Royal Institute of Public Health, held in Edinburgh, July, 1914 In the original paper there is a review of the various data bearing upon the question. In this excerpt only the facts observed in Manchester in connection with the control of the milk-supply are dealt with.

progress made is possibly better shown by the number of tubercle bacilli present in the milk. The following observations indicate a very considerable improvement in that respect.

In 1896 the number of cows with gross tuberculous lesions of the udder was much greater than at present, and the bacilli which could be revealed in the *mixed milk* reaching Manchester were numerous enough to be detected by direct rapid microscopical examination of the sediment of 40 c.c. of the fluid in nearly 20 per cent. of the samples capable of producing tuberculosis by inoculation. After three years' work tubercle bacilli could still be detected by direct microscopical examination in 16 per cent. of the tuberculous samples.

TABLE I.—MANCHESTER. MIXED MILK COLLECTED AT RAILWAY STATIONS OR OTHER PLACES THAN THE FARMS, 1897–1913.

	Years.	No. of Samples Examined.	Number Tuberculous.	Percentage.
	1897–1899	110	19	17·2
At beginning ...	... ...	110	19	17·2
	1900	358	40	11·1
	1901	440	43	9·7
	1902	424	38	8·9
	1903	430	51	11·8
	1904	425	43	10·1
First five years ...	... ...	2,077	215	10·3
	1905	757	60	7·9
	1906	704	47	6·6
	1907	722	43	5·9
	1908	341	30	8·7
	1909	649	36	5·5
Second five years...	... ...	3,173	216	6·8
	1910	534	32	5·9
	1911	611	55	9·0
	1912	582	67	11·5
	1913	594	67	11·2
Last four years ...	... ...	2,321	221	9·0
Totals	... ...	7,681	671	8·7

At the present time—*i.e.*, eighteen years after the beginning—by following exactly the same method, the microscopical examination reveals tubercle bacilli in not more than 3 per cent. of the samples of mixed milk capable of producing tuberculosis by inoculation. The lesions produced in experimental animals by tuberculous milk at the present time are also on an average very much slighter than those which were produced by the injection of the same amount of fluid under exactly the same conditions eighteen years ago.

In attempting to estimate the effects which the improvement in the milk-supply may have had upon the mortality from tuberculosis, it is necessary to allow for any improvement which may have been due to sanitary measures not directed against tuberculous milk. It is not

possible to do this with absolute accuracy, but it is obvious that any improvement in the general death-rate may be taken to indicate roughly the effects of various improvements in the hygienic state of the town, including improvement in the milk-supply. It may also be surmised that the steps taken to reduce the chances of infection from person to person must produce on the mortality from various forms of tuberculosis effects differing from those resulting from measures directed against food infection only.

If the reduction in the mortality from tuberculous diseases other than phthisis is proportionally greater than the reduction in the mortality from phthisis and from all causes, it is reasonable to claim that this result is in all probability due to improvement in the milk, and the amount of that improvement may be taken as a basis for an approximate estimate of the share taken by bovine tuberculosis in the infection of human beings.

The position of Manchester with regard to mortality from all causes, and from tuberculosis in particular, was very bad twenty years ago, and, notwithstanding the great improvement which has taken place since then, Manchester has still much to do in order to reach the high level attained by certain towns. It is very doubtful whether it is possible to compare any two towns, not only because it is difficult to find two towns absolutely comparable as regards social, commercial, and other conditions, but also because it is impossible to appreciate how the various administrative measures are carried out and interact in various centres. When possible, it is best to compare the effects of various measures in the same town, and to compare these various effects with those observed on an average through the whole country.

In order to appreciate the effects of sanitation during a certain period, it is necessary to take account of the *initial state*, and to estimate by the *rate of improvement* the effects of the work done. This is the method which I have adopted. I have prepared the following tables from the data published by the Registrar-General and those given by Dr. Niven in his annual reports, supplemented by fuller information which he has kindly supplied me with. These tables show what the position of Manchester has been between the years 1891 and 1913 with regard to the mortality from all causes, from phthisis, and from tuberculous diseases other than phthisis, in three groups of persons: (*a*) Persons at all ages; (*b*) children under five years of age; (*c*) children under one year of age. In each case I have taken the death-rate for the quinquennium 1906–1910 as a term of comparison to find what relation there is between that unit and the rates for the previous years or quinquennia. This is what I call the ratio to the 1906–1910 rate. From this ratio it is possible to ascertain how many persons died in 1890, for instance, for each person (or 100 persons) dying from the same cause

during any of the subsequent years on an average. In Table II., for instance, we find that the number of deaths from all causes correspond-

TABLE II.—MANCHESTER. ANNUAL RATES OF MORTALITY PER 1,000 PERSONS LIVING AT ALL AGES.

Quinquennia.	All Caus s.		Phthisis.		Forms of Tuberculosis other than Phthisis.	
	Rate.	Ratio to 1906–1910 Rate.	Rate.	Ratio to 1906–1910 Rate.	Rate.	Ratio to 1906–1910 Rate.
1881–1885	23·6	1·33	2·42	1·46	0·92	1·56
1886–1890	24·6	1·36	2·24	1·36	0·95	1·6
1891–1895	23·6	1·33	2·09	1·26	0·97	1·64
1896–1900	22·7	1·28	2·04	1·23	0·82	1·39
1901–1905	20·1	1·13	1·94	1·17	0·71	1·20
1906–1910	17·7	1·00	1·65	1·00	0·59	1·00
Years.	—	—	—	—	—	—
1911	*17·1*	*0·96*	*1·56*	*0·93*	*0·52*	*0·88*
1912	*16·2*	*0·91*	*1·53*	*0·92*	*0·54*	*0·91*

MORTALITY RATIOS FOR PERSONS AT ALL AGES (1906–1910 = 1).

	1891–1895[1] / 1906–1910	1912[1] / 1906–1910
All causes	1·33	0·91
Phthisis	1·26	0·92
Tuberculosis other than phthisis	1·64	0·91

TABLE III.—CITY OF MANCHESTER. DEATH-RATES PER 1,000 OF THE POPULATION UNDER FIVE YEARS.

Quinquennia.	All Causes.		Phthisis.		Forms of Tuberculosis other than Phthisis.	
	Rate.	Ratio to 1906–1910 Rate.	Rate.	Ratio to 1906–1910 Rate.	Rate.	Ratio to 1906–1910 Rate.
1891–1895	81·7	1·43	0·36	0·92	6·38	1·98
1896–1900	81·9	1·44	0·44	1·12	5·19	1·61
1901–1905	68·7	1·20	0·33	0·84	4·10	1·27
1906–1910	56·8	1·00	0·39	1·00	3·22	1·00
Years.	—	—	—	—	—	—
1911	*53·1*[2]	*0·93*	*0·20*	*0·51*	*2·57*	*0·79*
1912	*47·75*	*0·84*	*0·27*	*0·69*	*2·68*	*0·83*
1913	*47·22*	*0·83*	*0·41*	*1·05*	*2·48*	*0·77*
1911–1913	*49·35*	*0·86*	*0·29*	*0·74*	*2·58*	*0·80*

ing to 100 in 1906–1910 was 136 in 1886–1890. I devised this method to obtain comparable figures, and to estimate the progress effected

[1] The ratios for the twenty years preceding 1910 are directly proportional, those for the years following 1910 are inversely proportional to the rate of improvement.
[2] Population estimated on the 1891–1901 Census figures.

during a certain period with regard to various causes of death. I have preferred to use the more recent rate as my unit of comparison, because it offers greater guarantees of accuracy than the rates relating to the beginning of the selected period, and is therefore a more satisfactory basis of comparison as regards the more recent returns.

MORTALITY RATIOS FOR CHILDREN UNDER FIVE YEARS (1906–1910 = 1).

	1891–1895 / 1906–1910	1911–1913 / 1906–1910
Ratio for all causes	1·43	0·86
For phthisis	0·92	0·74
For tuberculous diseases other than phthisis ..	1·98	0·80

TABLE IV.—CITY OF MANCHESTER. DEATHS OF CHILDREN UNDER ONE YEAR PER 1,000 BIRTHS.[1]

Quinquennia.	All Causes.		Phthisis.		Forms of Tuberculosis other than Phthisis.	
	Rate.	Ratio to 1906–1910 Rate.	Rate.	Ratio to 1906–1910 Rate.	Rate.	Ratio to 1906–1910 Rate.
1891–1895	186·46	1·26	0·28	0·90	11·05	2·12
1896–1900	192·16	1·30	0·46	1·48	9·16	1·76
1901–1905	172·78	1·17	0·25	0·80	7·42	1·42
1906–1910	147·28	1·00	0·31	1·00	5·19	1·00
Years.						
1911	*156·11*[1]	*1·05*	*0·27*	*0·87*	*3·87*	*0·74*
1912	*122·30*	*0·83*	*0·17*	*0·54*	*3·42*	*0·65*
1913	*128·70*	*0·87*	*0·42*	*1·35*	*4·25*	*0·81*
1911–1913	*135·70*	*0·93*	*0·28*	*0·90*	*3·84*	*0·74*

MORTALITY RATIO FOR INFANTS UNDER ONE YEAR (1906–1910 = 1).

	1891–1895 / 1906–1910	1911–1913 / 1906–1910
All causes	1·26	0·93
Phthisis	0·90	0·90
Tuberculous diseases other than phthisis	2·12	0·74

These three tables show that as regards mortality from all causes, and from the selected causes, there has been between the years 1891 and 1910 an improvement, indicated by the following ratios:

Age Groups.	All Causes.	Phthisis.[2]	Tuberculosis other than Phthisis.
Persons at all ages ...	1·33	1·26	1·64
,, under five ...	1·43	0·92	1·98
,, ,, one ...	1·26	0·90	2·12

[1] Estimated on the 1891–1901 Census figures.

[2] The number of deaths from phthisis in very young children is so small that the statistics relating to that cause of death in children under five have a doubtful value when they relate to the population of a single town with a population under 1,000,000.

The ratios for all causes and for tuberculosis other than phthisis show that the rate of reduction in the mortality from these causes has been much the greater in the case of tuberculosis other than phthisis.

The ratios relating to infantile mortality seem to indicate clearly a great improvement probably attributable to the reduction in the amount of tuberculous milk.

It might, however, be supposed that the reduction in mortality from tuberculous diseases observed in Manchester is the result of some improvement which has taken place all through the country, owing to the better education of mothers, better sanitation and social conditions, and various other possible causes.

In order to ascertain whether this was the case, I have prepared from the returns published by the Registrar-General tables relating to England Wales corresponding to the Manchester tables.

TABLE V.—ENGLAND AND WALES. CRUDE AVERAGE DEATH-RATE FROM ALL CAUSES, PHTHISIS, AND FORMS OF TUBERCULOSIS OTHER THAN PHTHISIS.

Quinquennia.	All Causes.		Pulmonary Tuberculosis and Phthisis.		Forms of Tuberculosis other than Phthisis.	
	Rate.	Ratio to 1906–1910 Rate.	Rate.	Ratio to 1906–1910 Rate.	Rate.	Ratio to 1906–1910 Rate.
1891–1895	18·718	1·27	1·462	1·32	0·661	1·44
1896–1900	17·685	1·21	1·322	1·20	0·583	1·27
1901–1905	16·004	1·09	1·215	1·10	0·524	1·14
1906–1910	14·610	1·00	1·100	1·00	0·457	1·00
Years.	—	—	—	—	—	—
1911	*14·595*	*0·99*	*1·062*	*0·96*	*0·406*	*0·86*
1912	*13·290*	*0·90*	*1·017*	*0·92*	*0·349*	*0·74*

By means of these tables it is easy to compare the $\frac{1891–1895}{1906–1910}$ ratios for the whole of England and Wales with those for Manchester.

The statistics relating to various age-groups indicate, therefore, a very much greater improvement with regard to tuberculosis other than phthisis than with regard to phthisis or to all causes of disease. It is to be noticed, however, that an improvement of the same kind, but not of the same magnitude, is indicated by the statistics relating to the whole of England and Wales.

The work done by other great towns in England was begun later, and sometimes much later, than in Manchester. This work must also have had an effect upon the mortality of children from various diseases, including tuberculosis other than phthisis, all through the country. It may, therefore, be reasonably supposed that the greater improvement

in Manchester indicates only a part of the total improvement attributable to the reduction in the amount of tuberculous milk. The differences between the ratios for the whole of England and Wales, and those for

TABLE VI.—ENGLAND AND WALES. MORTALITY UNDER ONE YEAR AND UNDER FIVE YEARS FROM ALL CAUSES, AND FROM TUBERCULOUS DISEASES.

Years.	Under One Year.				Under Five Years.			
	Proportion of Deaths to 1,000 Births.				Death-Rate per 1,000 Living under Five Years.			
	All Causes.		Tubercular Diseases.		All Causes.		Tubercular Diseases.	
	Rate.	Ratio to 1906–1910 Rate.	Rate	Ratio to 1906–1910 Rate.	Rate.	Ratio to 1906–1910 Rate.	Rate.	Ratio to 1906–1910 Rate.
1891–1895 } 1896–1900 }	153·33	1·31	7·92	1·80	57·73	1·46	3·93	1·59
1901–1905	137·82	1·18	5·91	1·34	49·32	1·22	3·11	1·26
1906–1910	116·95	1·00	4·40	1·00	39·54	1·00	2·46	1·00
1911	*130·06*	*1·11*	*3·81*	*0·86*	*43·7*	*1·10*	—	—
1912	*94·85*	*0·81*	*2·81*	*0·63*	*32·4*	*0·82*	*1·82*	*0·73*

TABLE VII.—RATE OF REDUCTION IN MORTALITY DURING THE TWENTY YEARS 1891–1910.

	England and Wales.[1]	Manchester.
	Ratio $\frac{1891–1895}{1906–1910}$	Ratio $\frac{1891–1895}{1906–1910}$
All ages—		
All causes	1·27	1·33
Phthisis	1·32	1·26
Tuberculous diseases other than phthisis...	1·44	1·64
Under five years—		
All causes	1·46	1·43
Tuberculous diseases other than phthisis...	1·59	1·98
Under one year[1]—		
All causes	1·31	1·26
Tuberculous diseases other than phthisis...	1·80	2·12

Manchester, may, therefore, be taken to indicate, without exaggeration, one of the effects which may reasonably be attributed to the *greater*

[1] The mortality ratios under five years and under one year in England and Wales are for the decennium 1891–1900 to the quinquennium 1906–1910, the rate for the quinquennium 1891–1895 not being given in the Reports of the Registrar-General. This, however, does not materially affect the ratios.

improvement in the milk-supply. The differences between the ratios relating to *tuberculosis other than phthisis* are as follows:

	England and Wales.	Manchester.	Gain for Manchester.[1]
All ages	144	164	20
Under five years	159	198	39
,, one year	180	212	32

This indicates a reduction for Manchester of between 20 and 39 in excess of that which, on an average, has taken place in the whole of England and Wales.

If the anticipations which we based in 1891 upon previous experimental, anatomical, and clinical experience had been mistaken, the work which we have carried out since 1896 could not have had the effects which have been observed. Our anticipations have also been justified by the experimental and bacteriological work done during the last twelve or fourteen years by various observers, including the members of the Royal Commission and ourselves.

Since this paper was written the Seventy-Fifth Annual Report of the Registrar-General has been issued, and at p. lxx I find a diagram indicating that since the quinquennium 1906–1910 there has been all through the country a much more marked average reduction of mortality from all forms of tuberculosis than from phthisis alone. Thus the improvement which I had noticed in Manchester more than ten years ago has, during the last three or four years, become noticeable in the rest of the country.

In conclusion, it appears to me reasonable to say that, although there is not complete agreement in the results obtained by various observers as to the exact amount of human tuberculosis attributable to the consumption of tuberculous cow's milk, there is clear and cumulative evidence that cow's milk plays a very important part in the production of infantile tuberculosis in England and Scotland.

[1] These gains are a little greater than those I indicated in one of my previous papers, in which I had not been able to use the 1906–1910 quinquennial figures.

SURGICAL TUBERCULOSIS IN CHILDHOOD.[1]

By R. LAWFORD KNAGGS,
M.D., F.R.C.S.,
Professor of Surgery in the University of Leeds.

What is meant by the term "surgical tuberculosis"? The treatment of tuberculous disease is generally held to belong to the province of the physician, and indeed it remains a medical disease from start to finish. Whatever the form it may take it has to be combated by medical means, and the object of such is: (1) To improve the general health of the sufferer; (2) to raise his constitutional powers to the highest pitch; and (3) to develop certain specialized protective powers by which we now know the invading bacillary army can best be checked and often destroyed. This duty falls to the physician; but as the disease gains ground certain conditions may develop which hamper his efforts, and which his training does not fit him to deal with. Thus, there arise certain collections of fluid having distinctly poisonous qualities, or by their position and bulk constituting a distinct danger to life. Clearly these must be got rid of. Or caseous masses result from dying tuberculous tissue and lead to suppuration and abscesses. These, if left to themselves, will come to the surface, discharge, and then become contaminated with septic organisms, and so lead to more rapid progress of the disease. When such conditions arise, the man who uses his hands has to come to the help of the man who uses his brains, and by the safe removal of the "peccant" fluids, in accordance with the rules of the surgical art, has to take a share in the treatment of the disease.

Let it be clearly understood, then, that in the treatment of tuberculosis both the physician and the surgeon may each have to take a part. But though the surgeon has to be requisitioned for certain features that may develop, yet at no time ought the medical treatment to be omitted. Medical treatment is essential in every case; surgical treatment in a certain proportion is a necessary adjunct, and as it is chiefly concerned in the clearing away of dead or harmful material it has been characterized as "scavengering."

But do not let this derogatory description of the character of surgical aid blind us to its great value. Few things are more striking than the effects of this scavengering. The removal of a poisonous

[1] Substance of an Address delivered at the Sixth Annual Conference of the National Association for the Prevention of Consumption and other forms of Tuberculosis at Leeds, July 7, 1914.

effusion, or a large focus of disease generating the toxins whose absorption is the cause of failing health and strength, is often attended with such immense relief that within the space of a week or two a patient may have attained to a much higher plane of health, and be steadily reacting to that medical treatment which, before the surgeon's intervention, had seemed to be absolutely useless.

Principles of Surgical Aid.

Now the surgeon, when he is called upon to remove these harmful products of the tuberculous parasite, bases his procedures upon one of two principles. Either he clears away the disease or the tuberculous fluid, removing only what is unhealthy, or he goes wide of the disease, and cuts through the surrounding healthy parts, taking away healthy tissue as well as unhealthy.

The first principle—the removal of disease alone or of effusions—is the only one admissible in certain cases. In this group are included such different conditions as tuberculous ascites and tuberculous pleuritic effusion, spinal abscesses, glandular abscesses, and tuberculous inflammation of the interior of many bones.

The second principle—the removal of the disease by dissection through the surrounding healthy tissues—is designed to remove the whole of the disease and to obtain a clean wound carefully preserved from infection by the material which is being taken away. The cases that lend themselves to this method are those in which the mischief is confined to an organ having a definite capsule, by which extension of the disease to the surrounding tissues is prevented for a long time. In such cases, if removal be completed before the capsule has ruptured, the prospect of complete eradication of the disease is distinctly enhanced. The cases that can be treated in this way include many instances of tuberculous glands and of renal tubercle.

The same principles hold in the case of joint tubercle. But here another important matter besides the cure of the disease forces itself upon the surgeon's attention. The treatment must be so directed that when cure is complete the limb remains as useful and as free from deformity as possible. The best results are those achieved with no other aid from the surgeon than such measures as will keep the joint fixed and at rest, and will prevent deformity. The disease is checked and cured almost entirely by medical means. But amongst the poorer classes medical measures have rarely the shadow of a chance. Our general hospitals are supplied with very large numbers of joint cases from these classes, and they are quite unable to provide them with the treatment which would cure a large proportion of them if they could be taken thoroughly in hand at an early stage. Sooner or later, in the majority, conditions arise which necessitate surgical inter-

ference—it may be to save a limb, or sometimes to prevent the loss of a life. Now, in such surgical proceedings as aspiration of abscesses, or erasions of joints, the first of the two principles is involved; whilst the second is seen in excisions of joints and amputations.

The Nature of Tuberculous Infection in Children.

I have attempted to give you a bird's-eye view of the main principles which guide the surgeon when he is called upon to supplement the medical treatment of tuberculosis. His help is required with great frequency in certain manifestations of the disease, and it has become customary to apply the term "surgical tuberculosis" to such cases as commonly call for his intervention. As a matter of course, these cases come into the surgeon's charge at an early date, both in hospital and in private practice. It is, therefore, both a matter of interest and of duty that he should understand how the main forms with which he comes in contact originate.

It has long been recognized that abdominal tuberculosis in children was due to infection conveyed to them in their food, whilst pulmonary tuberculosis was the result of an infection inhaled through the respiratory passages. So roughly it came to be believed that the first form was in the main contracted through tuberculous cows, and the latter from tuberculous human beings. But there was very great difficulty in unravelling the problems that were raised by these two forms of infection. How was that produced by the human bacillus to be distinguished from the infection due to the bovine microbe? That milk frequently contained bacilli which came from cows with tuberculous udders was well known; but these bacilli had no definite characteristics by which they could be certainly distinguished by the microscope from the bacillus of tubercle obtained from human sources. Evidently the microscope could not decide whether a tuberculous lesion had a human or a bovine origin. This difficulty was at last solved, and it is now possible, by means of laboratory methods which need not be described now, to decide whether any particular case of tuberculosis is of the human or the bovine form.

This advance is full of interest. It will enable the local incidence of the disease to be certainly attributed to its real cause, and will point with clearness to the measures which should be taken for its prevention. When once this point had been solved, pathological workers began to show that such common surgical conditions as tuberculous cervical glands and tuberculous bones and joints were in some cases due to human infection, and in others to the bovine. But the most thorough and systematic results come to us from the laboratory of the Royal College of Physicians of Edinburgh. Dr. John Fraser has investigated seventy consecutive cases of bone or joint tubercle, with three excep-

tions of twelve years of age or under. Dr. Philp Mitchell has investigated seventy-two consecutive cases of tuberculous cervical glands in children up to the age of twelve years. All these cases were drawn from the Edinburgh district. The results are worth your attention. Of the bone and joint cases, up to eight years of age, the bovine infections were twice as numerous as the human infections (viz., thirty-nine to nineteen); but though the proportion fell slightly after eight years, yet of the whole 70 cases, 41 were bovine, 26 were human, and 3 were both bovine and human. Of the 72 cervical gland cases 65 were due to bovine infection, and 7 to human, and again the disparity was greatest in the younger children. Therefore the large majority of these 142 cases, all except 3 young children, derived their disease from food. From this it will be seen that so far as the Edinburgh area is concerned, there is good reason to feel sure that a very large proportion of the commoner forms of surgical tuberculosis in children are due to bovine tubercle.

But the collateral facts connected with these two groups of cases are also instructive. There was a history of pulmonary consumption in the patient's family in only three of the gland cases, but each of these cases had been living in contact with a consumptive when the glands appeared, and in all the human type of bacillus was isolated from the cervical glands.

A similar suggestion of the association of the human infection with a family history of pulmonary tuberculosis comes out in the bone and joint cases, but not quite so convincingly. In twenty-one cases there was a history of pulmonary tubercle in the family, and in fifteen of these the infection was human (and in six bovine). In half the cases the child had been living in contact with a consumptive when the bone lesion developed. On the other hand, in those cases which showed no family history of pulmonary tubercle, the bovine infections were forty-three and the human only nine.[1] After reading these results it is not astonishing to learn that the great majority of these children were bottle-fed, that no sterilization of the milk was attempted, and that the veterinary supervision of the byres in the area was utterly inadequate.

The Edinburgh results show a much greater incidence of bovine tuberculosis than those of other observers, but they are more systematic, and practically limited to children up to twelve years of age. Now, it is during the early years of life that milk is so largely used as a staple food, so that as age increases it seems only natural that the human should come to outnumber the bovine infections, and that in adults the infection should be almost entirely human.

[1] In three cases both bovine and human infections were present. This must be remembered if the numbers are checked.

The habits of a population and the kind of control exercised over the byres and the milk-supply must have a considerable influence upon the amount of bovine infection in different places; consequently the Edinburgh figures only convey to us the condition of things in that district. Each local area would have to be investigated on similar lines, and uniformity of results could not be expected.

But already it is clear, so far as surgical tuberculosis is concerned, that a case will be made out for the drastic supervision of milk-producing cows. It appears that a cow may give milk infected with tuberculous bacilli for some time before it shows any sign of illness, or before its milk can be recognized as not normal by those who are accustomed to milk it. It is also stated that clinical examination of the animals cannot be relied on to detect early tubercle of the udder, and that the most reliable method for the detection of the tuberculous infection in milk is by the injection of the milk into one of the experimental animals (a guinea-pig or a rabbit). That this plan, however perfect, will ever come into universal use for the object of weeding out all tuberculous cows at the very earliest period of the disease is, I think, not very probable. But there can be no question that if tuberculous milk is prevented being put upon the market there will be a very *great diminution* in the amount of surgical tuberculosis in children.

Tuberculous Glands.

In many cases of tuberculous glands, especially when met with in the neck, the disease is so widespread, and the tendency to caseation and suppuration so marked, that surgical effort has frequently to be limited to the opening of abscesses and scraping away of the débris and the tuberculous tissue in the interior of the broken-down glands. Dismal as these cases appear they not infrequently show a marvellous power of recovery. But they are very slow and tedious, and may drag on, with constantly recurring glandular trouble, for a number of years before the weakness is overcome, and they gradually pass into a condition of good health. There are many people going about to-day, leading useful and valuable lives, who will never forget the never-ending trouble with their glands, which spoilt the pleasure of their early years. The shadow of it still remains in the disfiguring scars which are a constant mortification as well as a reminder of their youthful misery.

But if, when the glands of a definite area become affected, a wide removal of them is carried out, the result, as a rule, is extremely satisfactory. The excision should be free. If only the enlarged glands are removed, others which are infected but not much enlarged are left behind, and recurrence will take place; so that to get the best results the whole lymphatic area should be cleared away. Parents naturally

shrink from operation upon their children, and would prefer that it should be as little formidable as possible. But it would be well that they should appreciate how much is to be gained by thoroughness in this matter. It may be summed up in a few sentences. They may be assured that: (1) the treatment of the case will be shortened by many months or even years; (2) convalescence will be hastened; and that (3) the result will be more permanent and scarring less. Moreover, if excision is resorted to early, the less serious and extensive is the operation that will be required.

Bones and Joints.

The other great group of surgical tuberculosis is that of bones and joints. Tubercle of bone, when it affects the ends of the long bones, is inseparable from joint tubercle, for the disease advances from the bone to the joint, or if the soft structures of the joint are first attacked the disease spreads in the other direction—*i.e.*, from the joint to the bones.

But tubercle often attacks the shaft of a bone, and remains for a long time a disease of bone purely, and has to be dealt with on the same principles which guide the surgeon's action in the case of glands: (1) The shaft of the bone may be opened up, and the tuberculous tissue removed by scraping until healthy bone is reached; the cavity left is suitably dressed; the wound is then closed and heals promptly; or (2) a piece of the bone containing the disease is removed entire from the periosteal envelope of the bone. The separation in the continuity of the bone is made through a healthy part, and some healthy tissue is removed with the disease.

The scraping method is the one more commonly called for, but in certain situations the more radical procedure can be used with gratifying success. In the forearm and the leg there are two parallel bones, and certain portions of these, if affected by tubercle, can be removed from inside the periosteum, which is then filled by a wax or paste and closed. If pains are taken to prevent this cylinder of soft paste from crumpling up, in the course of a few months the place of the paste is taken by new bone thrown out by the periosteum, and a bone having the same shape as the original one is reproduced. The value of the parallel bone is that it acts as a splint, and is useful in preventing the crumpling up.

It is hardly necessary to point out that after the second procedure there is less danger of recurrence than after the first, for in the scraping operation it is quite possible for some ramification or outlying nodule of disease to escape destruction and so predispose to relapse. As in the case of excision of glands, the second method shows the trend of surgical opinion to go wide of the disease and cut through healthy tissues. It aims at leaving behind no outlying portion of tubercle from which recurrence can result.

Practical Measures.

I propose to devote the remainder of my time to the consideration of the treatment of joint tuberculosis and to only one remedial agent—viz., rest.

Of all methods which have been employed this is the one that has stood the test of time, and it now occupies an assured position from which it is not likely to be dislodged. Fifty-four years ago—in 1860—John Hilton, in the introductory portion of his famous lectures on "Rest and Pain," wrote these words: "It is rest—physiological as well as mechanical—which I hope to prove in the course of these lectures to be so important as to demand the very serious attention of every practical surgeon." From that time rest has been the fundamental principle in the treatment of inflamed joints, and amongst others of tuberculous ones. Many other methods have been introduced from time to time, some more, others less, useful. Some have disappeared, some have remained; but not to supersede rest, only to be employed side by side with it, or in certain phases or conditions.

Now I do not wish to imply that operative procedures have not their proper place in the treatment of tuberculous joint conditions, but to-day it would be out of place for me to spend time upon their discussion, and rest, if properly made use of, will, in a large proportion of cases, make recourse to them unnecessary. In dealing with tuberculous joints of the upper extremity the surgeon does not meet with any insuperable difficulty in the maintenance of a condition of continuous rest, but the lower extremity is much more troublesome to manage. Various forms of apparatus can be employed which enable the knee and the ankle to be kept fixed and at rest without necessarily confining the patient to bed.

But the most difficult of all is the hip-joint, and though a very useful splint is available, yet the leverage of the limb, the difficulty of maintaining extension, and looking after the child's cleanliness, make the recumbent position necessary, if adequate rest is to be secured. The large majority of cases of hip disease occur amongst the poorer classes, and of necessity come for treatment to a hospital. Their home surroundings are as a rule quite unsuitable for any case of tuberculous disease, and the management of a hip case is quite impossible in them. Only in a hospital can these cases get the rest and extension treatment which is so essential to their recovery. But the general hospitals can only give them a small portion of the help that is needed. They cannot retain cases of hip disease as in-patients for a sufficient length of time for recovery to take place.

This is what occurs. These cases are admitted in the early stage of the disease and kept in bed for rest and extension for perhaps three

months, and then the more acute symptoms having subsided, they are fixed up in Thomas's splints and treated as out-patients. Various circumstances connected with the child, its parents, and their household arrangements, make this period of treatment spasmodic, fitful, and unsatisfactory. Before long many of the cases come back with a relapse, and are again admitted, and the same process is repeated, perhaps more than once. Then abscess formation occurs, and rapid deterioration of the patient results in operative procedures—probably excision—when the patient enters upon a period of prolonged convalescence which may end in recovery in a fair proportion of cases, or may be interrupted by further relapses, and possibly ultimate amputation or death.

In the Alexandra Hospital for Hip Disease in Queen Square, Bloomsbury, cases of hip disease are admitted and not sent out until they are fit to go. They may be kept in for two or three or more years, and are treated by rest and extension. Now in 1880 a Committee of the Clinical Society, composed of seven of the leading surgeons of the day, was appointed to investigate the results of the treatment of hip disease, and an opportunity occurred of contrasting the results following operation (*i.e.*, excision) with those obtained by rest. For this investigation the Hip Hospital furnished 384 cases which had been treated by prolonged rest and weight extension. The report of the Committee is an important landmark in the history of the treatment of hip disease. Twenty years after Hilton gave his lectures it was shown: (1) That the mortality of cases treated by rest and extension was considerably less than that of cases treated by excision (33·5 to 40 per cent.); (2) that after treatment by rest and extension the limb is more firm and useful for purposes of progression than after excision. These conclusions find general acceptance to-day, thirty-four years after that report was made, yet there have been only one or two moves in hospital arrangements to meet the situation.

In Leeds our hospital authorities are well aware that these hip cases are very inadequately dealt with under present arrangements, and I know they would like to see their way to do something more for them. Now this need not be made a very expensive matter. The first thing to be recognized is that hip-joint cases, when once the disease is diagnosed, should be taken charge of, and kept in hospital and treated with rest and extension, with good food and abundance of fresh air for as long a time as may be necessary. The time required might be from one to two years, sometimes three, and possibly in rare instances, four years. They should be kept entirely outside the scope of the ordinary hospital routine, and a separate building, preferably in the country and on high ground, set apart for them. The building need be little more than a big verandah in which the children would

live. There would be need for some rooms for the staff and for protection of the children in very inclement weather, but I understand that in practice it is found that the only use for these latter rooms is for the punishment of those children who are naughty. They are threatened that they will have to get indoors at night, and the threat is sufficient. The nursing staff would not be large, for the only operations would be the aspiration or drainage of abscesses, and few dressings would be called for. And lastly there would be the cost of living and of the general household menage.

It may be that the actual cost of this continuous rest treatment of hip cases will prove to be no more than is now spent upon them during their intermittent periods of hospital residence, for the requisite operations and for the necessary apparatus and dressings during the years of their out-patient attendance.

This is the line that I hope some day will commend itself to the Board of the Leeds Infirmary when their present great responsibilities have diminished and permit other things to be considered. The responsibility of laying out money subscribed for hospital purposes is great. If it is spent to exploit new methods of treatment it may very soon be found that it has been thrown away. I would humbly suggest that it is safer and wiser and more economical to proceed upon old lines that have been proved to be sound. The treatment of tuberculous hip disease by rest and extension is now proved to be very sound, and the public money may be safely spent upon it with the certain knowledge that it will be well employed.

THE ARNETH COUNT IN PULMONARY TUBERCULOSIS.

By W. E. COOKE,

M.D., M.R.C.P. (EDIN.), D.P.H. (LOND.),

Medical Superintendent Ochil Hills Sanatorium and Coppins Green Industrial Sanatorium.

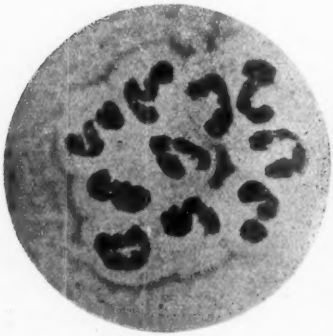
That changes in the polymorphs occurred in many infections has been known for a very considerable time, but the alterations in structure were not utilized in diagnosis, prognosis, or treatment until Arneth, in 1904, published his observations on the grosser nuclear appearances met with in certain diseases. That finer alterations in the chromatin network also occurs is, I think, unquestionable; but neither these nor the alterations in size, numbers, or staining reactions of the granules in the body of the polymorph have hitherto been turned to much

practical clinical advantage. This is not surprising, as the method of observation must necessarily be crude, compared with the vital phenomena which actuate such changes. But it is important to bear them in mind when one is considering the causes of the grosser changes which Arneth so ably described.

Arneth's observations led him to classify the neutrophile polymorphonuclear leucocytes according to their nuclear divisions. In Class I. he placed the polymorph whose nucleus had not undergone division; in Class II., those polymorphs whose nucleus was in two parts, Class III. in three parts, and so on to Class V. He went further than this, and arranged subdivisions to each class, according to the shape of the parts of the nucleus. For routine clinical work the simpler classification has been found to be quite adequate. There is rather a difficulty for those beginning the count in determining whether or not a nucleus has divided. *If there is any band of nuclear tissue, except a thin chromatin filament connecting the different parts of a nucleus, the nucleus cannot, for the purposes of the count, be said to be divided.*

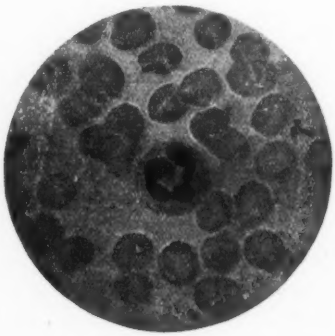
A glance at the accompanying diagrams and photographs will explain this better than many words.

CELL OF CLASS V. | CELL OF CLASS IV. | CELL OF CLASS III. | CELL OF CLASS II. | CELL OF CLASS I.



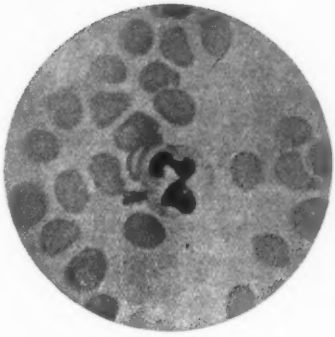
MICROPHOTOGRAPH I.

Typical cells of Class I. The top cell nucleus has divided, but as the lower part is folded on itself it is impossible to see how many divisions there are. That cell, therefore, should be passed.

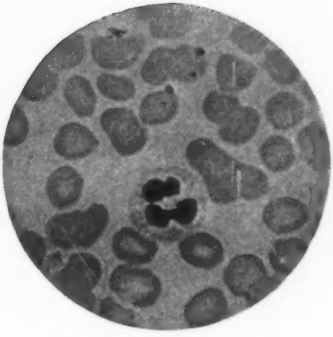


MICROPHOTOGRAPH II.

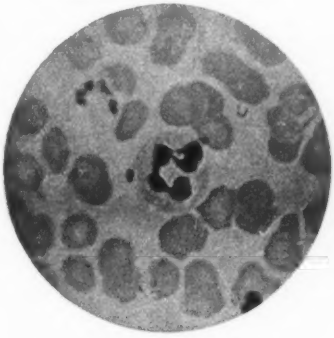
Another typical cell of Class I.



MICROPHOTOGRAPH III.
Another typical cell of Class I.

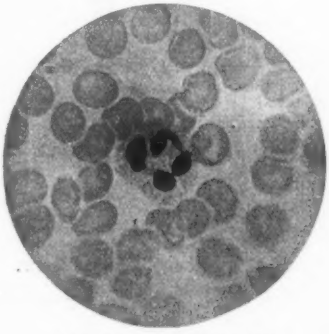


MICROPHOTOGRAPH IV.
A typical cell of Class II.

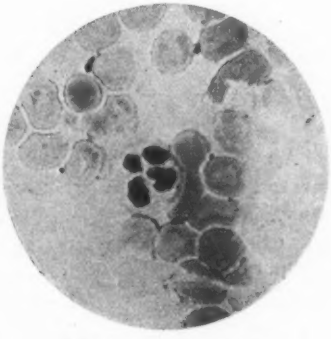


MICROPHOTOGRAPH V.
A cell of Class II. The upper part of the nucleus is joined to the three-lobed lower part by a fine filament. The broader band is the end of the nucleus turned posteriorly.

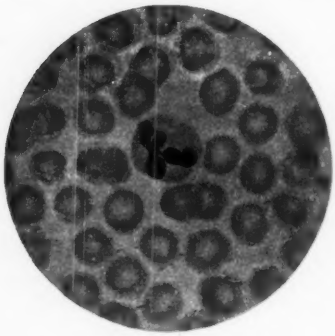
MICROPHOTOGRAPH VI.
A typical cell of Class III., with two cells of Class I. The lymphocyte should not be included in the Arneth count, of course.



MICROPHOTOGRAPH VII.
A cell of Class III.

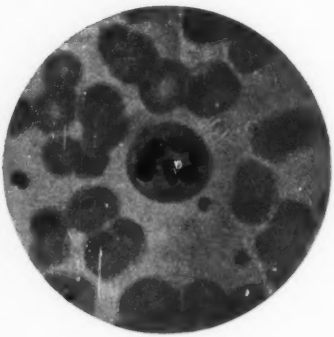


MICROPHOTOGRAPH VIII.
A typical cell of Class IV.



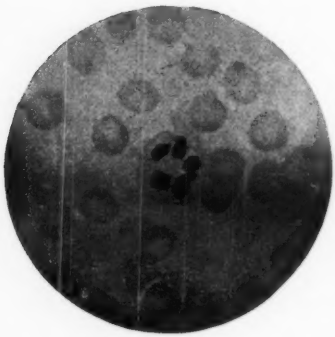
MICROPHOTOGRAPH IX.

Another cell of Class IV. The nucleus commences below, on the left. The third division almost touches the uniting filament between 1 and 2.



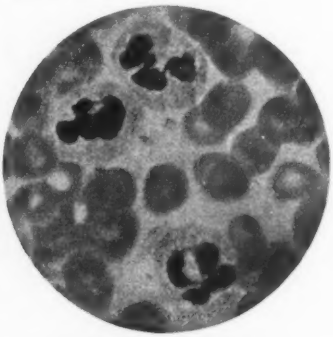
MICROPHOTOGRAPH X.

Another cell of Class IV. The three lobes on the right hand can be said to have divided. The three left-hand lobes must be counted as one. The photograph shows very faintly the separation between the ends of the nucleus, which obviously is situated between the lower centre lobe and the right lower lobe.



MICROPHOTOGRAPH XI.

Typical cell of Class V.



MICROPHOTOGRAPH XII.

Cells whose nuclei cannot be distinctly followed, and which, therefore, should be passed.

Arneth fixed his "normal" count by the average of fifteen normal persons, and obtained the following figures:

Cells of Class I.	Cells of Class II.	Cells of Class III.	Cells of Class IV.	Cells of Class V.
5 per cent.	35 per cent.	41 per cent.	17 per cent.	2 per cent.

For all practical purposes we can accept these figures as "normal." He found that in certain infectious diseases the ratio of cells of Classes I. and II. to those of Classes III., IV., and V. was altered, so

that instead of his "normal" picture he obtained a count in which there was a larger proportion of cells of Classes I. and II. He investigated the changes in pulmonary tuberculosis, pneumonia, varicella, morbilli, and erythema nodosum. In all of these conditions considerable alteration of the picture took place. The numbers in Classes I. and II. were larger than normal, and he found that the more severe the disease, the greater the alteration, and as the case tended towards recovery, this "drift" to the left became less marked; but if the case became worse there was a further increase in the number of cells of Classes I. and II.

The cause of this phenomenon is open to discussion, but one is inclined to the opinion that it is due to a "call" being made on the cells of the body for the production of "antibodies," etc., wherewith to combat the invasion, and the extent of the change in the polymorphs may be taken as an estimate of the amount of toxæmia. In pulmonary tuberculosis the "Arneth" is invaluable in diagnosis, prognosis, and as a guide to treatment.

Cases of pulmonary tuberculosis frequently present themselves with suspicious symptoms and indefinite physical signs. A blood-film showing an increase of large mononuclears, perhaps a slight increase in lymphocytes, and a dislocation of the "Arneth" to the left, is very strong evidence of the existence of an active tubercular focus. In a large percentage of cases the suggestion of tuberculosis is confirmed by the subsequent history, X-ray examination, or a diagnostic dose of tuberculin. Typical examples of this are the following:

Case I.—Female, aged forty. Suffered from "asthma" for four years.

Differential Leucocyte Count.

Lymphocytes.	Large Mononuclears.	Eosinophiles.	Basophiles.	Polymorphs.
31 per cent.	13 per cent.	3 per cent.	0	53 per cent.

Arneth Count.

Cells of Class I.	Cells of Class II.	Cells of Class III.	Cells of Class IV.	Cells of Class V.
37	30	33	0	0

A diagnosis of tuberculosis was suggested, and this was confirmed by the X-ray plate. Two months later tubercle bacilli were found in the sputum.

Case II.—Male, aged twenty-five years. Indefinite symptoms; no physical signs of tuberculosis, except very slight impairment of percussion note over an area about the size of a penny in the right base.

Differential Leucocyte Count.

Lymphocytes.	Large Mononuclears.	Eosinophiles.	Basophiles.	Polymorphs.
30 per cent.	18 per cent.	2 per cent.	0	50 per cent.

Arneth Count.

Cells of Class I.	Cells of Class II.	Cells of Class III.	Cells of Class IV.	Cells of Class V.
33	34	29	4	0

The radiograph fully confirmed the diagnosis of active tuberculosis.

It is not suggested, of course, that the combined counts should be used as the sole means of diagnosis, or that the above pictures are obtained in every case of active tuberculosis, and not in other conditions. But these deviations from the normal are suggestive, and frequently put one on the right "track."

One has often to give an opinion as to whether a case of tuberculosis has recovered. The Arneth count tells us whether any absorption of toxins is taking place, and therefore whether the lesion is active or quiescent. A left-handed dislocation always indicates toxæmia. Its usefulness in the examination of contacts is obvious.

As an aid to prognosis the Arneth count is very valuable. A case with few physical signs presenting a marked dislocation of the count to the left, which does not improve under treatment, must be looked upon as in grave condition. There is probably a larger amount of mischief than is indicated by the physical signs. If the count tends to assume a more right-handed appearance, the prognosis becomes more hopeful, according to the amount of that improvement. Examples of counts in advanced, moderately advanced, and early cases are—

Advanced Cases.

Cells of Class I.	Cells of Class II.	Cells of Class III.	Cells of Class IV.	Cells of Class V.
(1) 45	33	18	4	0
(2) 46	40	11	3	0
(3) 50	31	17	2	0
(4) 59	32	9	0	0

Less Advanced Cases.

Cells of Class I.	Cells of Class II.	Cells of Class III.	Cells of Class IV.	Cells of Class V.
(1) 37	30	33	0	0
(2) 35	37	26	2	0
(3) 37	36	23	3	1
(4) 32	35	30	3	0

Early Cases.

Cells of Class I.	Cells of Class II.	Cells of Class III.	Cells of Class IV.	Cells of Class V.
(1) 25	25	40	4	1
(2) 23	31	37	8	1
(3) 20	44	29	6	1
(4) 19	27	47	7	0

Lastly, the Arneth count is a guide to treatment. In treatment by tuberculin, the count affords evidence as to whether the focal reactions are taxing the patient's capacity of dealing with the toxins resulting from them. If tuberculin be pushed too far, there appears an increase in the cells of Classes I. and II. If the Arneth count is stationary, the dose has for the time being reached its therapeutic maximum. In treatment by "contra-toxin" the count is also useful. The bacteriolysis and phagocytosis generated by "contra-toxin" produce an auto-inoculation. This causes a further deviation of the count to the left; an indication therefore to temporarily reduce the dose, or discontinue its administration for a short time. When this is done the count soon assumes its previous appearance, and continues to move to the right. Further injections are indicated until the count becomes normal. The changes in the polymorph nuclei afford a sensitive and reliable index to the course the disease is taking, and it is a matter for regret that the Arneth count is not more utilized in this country.

THE "ALBUMIN REACTION" OF THE SPUTUM IN PULMONARY TUBERCULOSIS.

By E. G. GLOVER,

M.B.,

Medical Superintendent, Salterley Grange Sanatorium; late Assistant Medical Officer, King Edward VII. Sanatorium, Midhurst.

If, as all observers agree, albumin can be detected in the sputum in various definitely non-tuberculous affections of the lungs, such as passive congestion, etc., or if, as has been asserted by Wanner, Remlinger, Bezançon, and de Jong, traces of albumin can be found in practically all sputa, it is clear that the significance of its presence in pulmonary tuberculosis can be satisfactorily based only on routine quantitative estimations. Going on this assumption, 210 quantitative

examinations of the sputum were made in 149 cases coming under observation in the King Edward VII. Sanatorium at Midhurst.

Technique of the Reaction.

The accurate separation of albumin from the sputum, and the subsequent testing of the same, present at times considerable difficulty. The technique is as follows: The sputum is collected in a Petri dish, and to avoid as much as possible either the dissociation of true albumin present by proteolytic ferments, or the setting free of albumin from protein molecules by decomposition, is examined within three hours of collection. Separations of albumin are always to be made from the entire sample, and not, as by Ridge and Treadgold, from the purulent portions only, because in the bulk of doubtful cases and in many tubercular cases the various elements of the sputum are almost entirely homogenized, and it is not possible to separate even small quantities of purulent material.

In an ordinary filtration of the sputum in tuberculous cases the substances requiring definite consideration are the following: (1) Mucin, from the goblet cells of the mucous tract; (2) nucleo-albumin or phospho-globulin; (3) nucleo-proteid, from the disintegration respectively of the cell-plasm and nucleus of pus-cells; (4) albumoses, especially deutero-albumoses, and sometimes hetero-albumose; (5) serum albumin and serum globulin. The original method of Wanner, diluting the sputum with an equal volume of 3 per cent. acetic acid; or of Roger and Lévy-Valensi, adding a few drops of acetic acid to a watery solution of sputum, serve to exclude the first three substances, although it is to be noted that, if the acidification is not strong enough, phospho-globulin will pass through the filter and subsequently coagulate with heat. The albumoses, too, pass through in this method—a fact which renders all tests inaccurate except the heat test, and even then the addition of quantities of saturated salt solution to act as electrolyte will bring down the albumoses with heat, and although these may be dissolved out, yet the delicacy of the test, particularly in the presence of small traces of albumin, is impaired.

The method adopted by Lesieur and Privey, and later by Ridge and Treadgold, of adding to 1 volume of sputum 4 volumes of 0·85 per cent. solution NaCl, shaking, and acidifying slightly to litmus with a few drops of 3 per cent. acetic acid, is more satisfactory as far as the ultimate test is concerned, but in the examination of about thirty cases by this method it was possible still to separate from the filtrate some phospho-globulin and some albumoses, usually deutero-albumoses, and sometimes hetero-albumoses.

In the course of our investigation, tests were made with Witte's peptone with a view to finding the optimum acidification and strength

of salt solution necessary to salt out the albumoses. Equal parts of half-saturated salt solution, acidifying with 6 per cent. acetic acid, gave the maximum precipitation in twenty-four hours, although the same result could be obtained by heating the mixture in an incubator at 57° C. for one hour. Too strong a salt solution, however, if added to a thick purulent sputum, renders homogenization and subsequent filtration difficult. It has been found practicable to treat the sputum either by adding equal volume of water, shaking, adding 1 volume of half-saturated salt solution, shaking, and adding 1 volume of 3 per cent. acetic acid, or by adding 2 volumes of half-saturated salt solution directly, shaking thoroughly, and then adding 1 volume of 3 per cent. acetic acid. In the first instance there may be a partial precipitation of the globulins, but in any case too great stress cannot be laid on the globulin content, as a globulin-like body, probably one of the myosin group, has been demonstrated in leucocytes by Halliburton and others.

It is extremely difficult to thoroughly separate true albumin from the other albumins, unless by a boiling process, which is, of course, out of the question in this stage of the test. By salting-out methods, however, these other albuminous bodies may be fairly thoroughly removed, and if the filtration is properly carried out a clear filtrate should be obtained. *Filtration* is most satisfactory with a double ply of moistened Swedish paper. Chardin paper is sometimes useful in a preliminary filtration. It is important to obtain a clear filtrate, and it might be advisable, should the quantity of fluid permit, to take it through a candle-filter. Should the filtrate still contain precipitable albuminous substances not true albumin, an hour's heating at 57° C. and refiltration will usually serve to remove them.

Tests for Albumin in Sputum.

Boiling.—Any or all of the methods indicated for separating the albumin in solution are satisfactory, provided the ultimate estimations are based on the boiling test; but should acetic acid have been used in any quantity, it is necessary at this stage to add sodium hydrate until the solution is just acid to litmus. This has been insisted on by Bezançon and de Jong, who state that otherwise traces of albumin will be overlooked. Small quantities of albumin, too, require relatively greater quantities of salt solution to insure proper precipitation, and in doubtful cases the solution should be reboiled at intervals over a period of fifteen minutes. Finally, each precipitate must be tested for its insolubility in strong acid.

Nitric Acid Test.—Apart from the fact that strong nitric acid will partly dissociate even true albumins, the ring test does not give such delicate results as boiling, and is, moreover, unsatisfactory from the

quantitative point of view. Potassium ferrocyanide precipitates also albumoses and nucleo-albumin, and is in any case not so delicate as the boiling test.

Heavy Metal Precipitation.—Salts such as mercuric chloride precipitate immediately and entirely all the albumin present and the albumoses and nucleo-albumins, if present, although some of the albumoses are soluble in excess. It is extremely delicate, but can be used in sputum examinations only in the absence of all but the true albumins. Tanret's solution ($HgCl_2$, 1·35 grms.; KI, 3·32 grms.; glacial acetic, 20 c.c.; water, 50 c.c.) gives a method of rapidly estimating the approximate amount of albumin in a solution for subsequent confirmation by boiling. In the presence of quantities of salt solution the whole of the mercury albuminate is not thrown down.

Phosphotungstic Acid is an extremely delicate reagent, and has the advantage that in excess of a strong solution the albumoses are soluble. In the form of the Wolff-Junghaus reagent it, too, is useful for rapid approximate estimation.

Biuret Test, although useful sometimes in distinguishing by colour between albumins and albumoses, is only suitable where there is a moderately strong solution of albumin. It is most delicate in peptone examinations. *Millon's Reagent*, too, is insufficiently delicate. Trial was made of Jacquemet's method of investigating the albuminoid content of sputa, which consists in precipitating from the non-acidified filtrate the mucin by ammonium chloride, and, after refiltration, the albumin by boiling with a few drops of acid, and, similarly, the nucleo-albumins by saturated citric acid, and the albumoses by trichloracetic acid. The results were not satisfactory from the quantitative point of view.

Method of Quantitative Estimation.

Using ordinary test-tubes and graduated pipettes, 1 c.c., 2 c.c., and 9 c.c., dilutions in series of the filtrate can be made with accuracy, and, taking into account the original dilution of the sputum, a fairly accurate estimate can be made of the weakest dilution in which albumin can be detected. A portion of each dilution is kept, and the rest is boiled and then contrasted, in strong light against a black background, with the unboiled portion. In this way minute traces can be detected. Artificial light against a white background serves equally well. In dealing with very weak dilutions of the filtrate, it is advisable to re-estimate the reaction to litmus, and it must also be remembered that the salt content is then very small.

Delicacy of Test and its Relation to Weighed Quantities.

The boiling test, although less delicate than precipitation by heavy metals or phosphotungstic acid, is less open to error. The delicacy of

the boiling test may be gathered from the fact that guinea-pig serum and sheep serum from which the globulin fraction had been split by CO_2, showed traces of albumin in a dilution of 1 in 6,000. Human serum also was tested, and showed traces in dilutions of 1 in 9,000 and 1 in 10,000, although in these tests the globulin was not removed with the view to finding how far the albumin reaction in sputum could be influenced by the presence of minute quantities of blood, say, from the gums. Attempts, too, were made to estimate the weight of these traces. The albumin was precipitated by heat, measured quantities of acid and salt solution being added, and was collected on a dried tared filter-paper. To avoid the fallacy due to included salt in the dried filter-paper, another paper of equal tare was subjected to similar treatment, except that the solution contained no albumin. Both papers were washed and dried at 60° C. for equal periods, and it was found that a dilution of 0·000014 gram of albumin per c.c. will give definite traces on boiling.

Throughout the following series of cases quantitative estimations were made with the boiling test, but in each case as many confirmatory tests were carried out as the quantity of fluid would allow. In doubtful cases the sputum was examined for tubercle bacilli by the sedimentation method of Ellerman and Erlandsen, and the patient was tested where possible by subcutaneous tuberculin.

The following table shows the number of cases giving various definite quantities of albumin in the sputum, excluding those where blood or food was present macroscopically:

TABLE I.

Dilution showing Albumin.	Nil.	1 in 1 to 1 in 3.	1 in 3 to 1 in 5.	1 in 5 to 10.	1 in 10 to 20.	1 in 20 to 50.	1 in 50 to 100.	1 in 100 to 200.	1 in 200 to 400.	Total
Cases of active tuberculosis	1 (?)	4	9	11	11	10	24	13	17	100
Cases of arrested tuberculosis	—	1	—	2	1	2	—	—	—	6
Cases *non*-tubercular ...	1	1	1	3	3	2	3	—	—	14
Examinations of mouth contents	4	3	3	4	2	2	—	—	—	18

Regarding these results from the qualitative point of view, albumin found only in dilutions up to 1 in 5 would be considered a mere trace. The results of examination of mouth-contents of healthy individuals are interesting. Some specimens were simply normal saliva, others contained possibly some pharyngeal secretion, and others were taken after thoroughly brushing the teeth or shortly after a meal. In all except the purely salivary specimens traces of albumin were demonstrated. Kühne, as far back as 1866, noted the presence in saliva

from albuminous glands of a globulin-like body, alkali-albuminate, and a small amount of serum-albumin.

Table II. shows the average amount of albumin found in different groups of cases. All the examinations made are included in this table, except those of the contents of normal mouths.

TABLE II.

Number of Exams.	Class of Case.	Albumin Content.	
		Average Quantity.	Range.
100	T. B. + on ordinary examination ...	1 in 121	trace to 1 in 400
19	T. B. + by sedimentation only ...	1 ,, 64	,, ,, 1 ,, 300
18	T. B. – but focal reaction to tuberculin	1 ,, 20	nil ,, 1 ,, 100
34	Completely negative to tuberculin	1 ,, 28	,, ,, 1 ,, 100
10	Arrested but still with sputum ...	1 ,, 14	1 in 5 ,, 1 ,, 30
6	Blood present macroscopically ...	1 in 408	1 in 50 to 1 in 1,000
5	Food present macroscopically ...	1 ,, 33	1 ,, 10 ,, 1 ,, 80

This table has some bearing on the significance of the albumin-reaction, because, taking the average amount of albumin present in cases under suspicion, but proved to be non-tubercular, as 1 in 28, there were to be found amongst actively tubercular cases 39 giving a smaller quantity. This would seem to point that the significance of albumin in the sputum does not rest wholly on the tuberculous nature of the case.

With a view to clearing up this point, a table was made of the average amount of albumin in groups of sputa differing widely in their constitution. The character of the sputum having been noted in each case, it was found that these sputa could be divided into four classes: (i.) consisting entirely of muco-pus; (ii.) consisting almost entirely of muco-pus, but with an admixture of mucus and saliva; (iii.) consisting of muco-pus, mucus and saliva intermingled in almost equal quantities; (iv.) consisting of mucus and saliva only.

The following are the results:

TABLE III.

Sputum.	Class I.	Class II.	Class III.	Class IV.
T. B. + ...	1 in 221	1 in 114	1 in 40	1 in 13
T. B. – ...	1 in 100 (1 case)	1 ,, 61	1 ,, 29	1 ,, 8

This would seem to show that the amount of albumin in sputum could almost be judged by a superficial examination of the constituents of the sputum, the character of the sputum being taken as an indication of damage to the epithelial surfaces in the respiratory or buccal tract. It also shows that the tubercular case having a greater damage to his epithelial surfaces, has on the average a larger quantity of albumin in his sputum.

In considering the significance of the above results, it must be remembered that in this Sanatorium the differential diagnosis of pulmonary tubercle and chronic bronchitis does not often arise. In only three or four of these cases was chronic bronchitis an important element of the diagnosis. Moreover, during the last year in this Sanatorium there were at least seventy cases admitted in which the diagnosis was doubtful, and of these seventy thirty-eight had no sputum at all—*i.e.*, in 54 per cent. of the cases the test was inapplicable.

Conclusions.

1. That the sputum of phthisical patients contains, on the average, a larger amount of albumin than that of the non-tuberculous, but that the amount present in T. B. cases is often less than that usually found in the non-tuberculous. 2. That injury to the epithelial surface of any part of the respiratory or buccal tract may give rise to the presence of albumin in the sputum. It may be remarked, in conclusion, that a sputum test, the delicacy of which may be impaired by the vigorous brushing of teeth prior to expectoration, does not give promise of conclusive results or material assistance in the diagnosis of doubtful cases of pulmonary tubercle.

Remlinger: Société de Biologie, March 12, 1911.
Bezançon et de Jong: "Traité de l'examen des Crachats," 1913.
Ridge and Treadgold: *Lancet*, August 9, 1913.
Mann: "The Chemistry of the Proteids."
Roger et Lévy-Valensi: *Soc. Méd. des Hôp.*, July 23, 1909; *La Presse Médicale*, April 20, 1910; May 20, 1911.
Roger: *Soc. Méd. des Hôp.*, October 15, 1909.
Lesieur: "L'Albumino Reaction des Crachats," June, 1911 (*Soc. Méd. des Hôp. de Lyon*).
Privey: De l'Albumoptysie, Thèse Lyon, 1911.
Lesieur et Privey: *Paris Médicale*, 1911, vol. xiv.
Halliburton: *Journ. of Physiol.*, 15, 90 (1894).
Jacquemet: *Province Médicale*, 1912.
Kühne: *Lehrbuch d. Physiol.*, 1866.

THE TUBERCULOSIS CONFERENCE AT LEEDS.

By HERBERT DE CARLE WOODCOCK,
M.D., M.R.C.P.E., D.P.H.

Before the opening of the Conference on Tuberculosis, held under the auspices of a joint committee representing the City Council of Leeds, the University of Leeds, the National Association for the Prevention of Consumption and other Forms of Tuberculosis, and the Leeds Association for the Prevention and Cure of Tuberculosis, attention was called to it by Sir Berkeley Moynihan in his speech at the opening of the Tuberculosis Exhibition in the Leeds Town Hall. Sir Berkeley is not only a great English master in surgery: he is also an artist in words; and on this occasion he was more than that when he said: "If I could be sure of having one prayer answered, I should pray that the early stages of cancer might hurt people." Pain, he said, would lead sufferers from such diseases as cancer and tuberculosis to seek the healer betimes, when a confident hope of cure could still be held out to them. The words were full of profound imaginative thought and were worthy of the speaker. Sir Berkeley then warned this generation that none of the plagues which from time to time had left a black trail across vast regions of the earth had had any impression made upon their ferocity or their frequency by care for the individual victims. Let mankind care for the victims; let Christian civilization lessen the misery due to the havoc of war; but science alone could abolish the war itself. It was a noble oration, statesmanlike and suggestive. It pointed in no commonplace terms but in living words to the necessity of using, for the purpose of prevention, all means now known or in the future likely to be discovered. Sir Berkeley Moynihan's speech was made at the Leeds Town Hall, where Dr. Jacob had arranged his popular exhibition; it was at the Leeds University that the next chapter opened. Here Sir William Younger spoke, facing a crowded hall of delegates. The platform held the Council of the National Association for the Prevention of Consumption; the members of this Council sat among the members of the Leeds City Council, and the message was addressed not to them only, but to all civilization. "What chance have the poor under such housing conditions? Why should a working man when he takes a house—probably the only house available, and at a rent he cannot afford—be subjected to conditions under which he runs many times greater risk of tuberculosis attacking his family than does his wealthy neighbour in the square or the park?" Lord Salisbury preached a limit of ten houses to the acre, a limit which had produced

excellent results, especially in the children. Mr. Michael Sadler, the Vice-Chancellor of the University of Leeds, asked for a combined campaign of science and compassion—a notable phrase. Sir Robert Philip took us in fancy to the house of the tuberculous patient and pointed to the absolute certainty of infection of the healthy by the sick under ordinary conditions; he asked the municipality, and indeed all patriotic citizens, to set to work and make such conditions impossible. Councillor Carby Hall spoke of the adequate but cheap houses that Sir Robert had demanded. Dr. Cameron mapped out Leeds for us and gave us in his paper a textbook of reference, most useful when we are willing to get to work. Colonel Kyffin-Taylor, M.P., showed Liverpool to be another City of the Plain, only not deserving destruction because there were just men in its Gomorrah. Dr. T. D. Lister, of the Mount Vernon Hospital, who with a Yorkshire name had a Yorkshire personality and appearance, deplored, as Sir Berkeley Moynihan had done, the failure of the stricken to perceive that they were hit. Dr. Harold Vallow, Chief Tuberculosis Officer for Bradford, condemned the back-to-back house, for in Bradford pulmonary tuberculosis attacked these houses in far greater proportion than should be the case even according to the rigid reasoning of Professor Karl Pearson. Dr. Collis, Medical Inspector of Factories, would make factories into sanatoria; and he advocated transference of trades, the sending of the clogs of Oldham to the plough. Miss Emily Sadler called for better ventilation in factories, and she quoted Miss Taylor, H.M. Inspector for the Leeds district, to depict 28,000 men and 12,000 women working in the factories from 8 o'clock in the morning until 8 o'clock at night, or from 7 o'clock to 7 o'clock, or from 6 o'clock until 6 o'clock. The reiteration of the time figures was impressive; the bodily strain, the feeble physique of the workers, and the dusty air breathed by these 40,000 toilers were all made evident to us. Dr. H. G. Sutherland was as eloquent in Leeds as he is everywhere and always. He pointed to a high death-rate from pulmonary tuberculosis in model dwellings, and he asked why such dwellings should give results which one would expect only in a London slum.

On Tuesday afternoon Professor Lawford Knaggs spoke of Surgical Tuberculosis. Mr. Gauvain, of the Treloar Hospital, Alton, also spoke. The medical men especially found these addresses of great professional interest. We did not expect concurrence of views, and we did not get it. Professor Lawford Knaggs advocated early operation, while Mr. Gauvain held that the knife was the worst instrument a surgeon could use. Mr. Dobson explained that the Lord Mayor Treloar Hospital and College at Alton had advantages of equipment, situation and staff, which were almost impossible in a city hospital of the present day. Dr. Nathan Raw, of Liverpool, whose views are probably even

better known in Germany than in this country, looked keenly into the milk-can; the question of safeguarding the milk-supply was also dealt with in his own dry, incisive, quietly emphatic way by Mr. Harold Stiles, of Edinburgh, whose speech found great favour with his audience, as did also the impressive words of Professor Sims Woodhead, of Cambridge. The electrical treatment of milk was explained by Alderman Skelmerdine, of Liverpool. Mention should be made here of three addresses which were *not* given. Time was passing only too quickly, and in order to enable their colleagues from a distance to address the Conference, three Leeds representatives—Dr. Watson, Dr. Vining, and Mr. Daw—most courteously waived their claim to a hearing. I have seen the proof of Dr. Watson's paper on Tuberculosis in Childhood; it is full of thought and originality, and should command general attention when it appears in the Transactions of the Conference, which will be published shortly by the National Association at its office, at 7, Hanover Square, London, W. Dr. Watson thinks there are so many other causes than milk for tuberculosis in children that milk is receiving too much attention, while the other causes are receiving too little. Dr. Vining, who is also, like Dr. Watson, on the staff of the Leeds Infirmary and of Armley Hospital, had a paper on Local Tuberculous Infection. The omission of this paper was a loss to the Conference, for Dr. Vining is one of our individualists, looking at the problem of tuberculosis with a rare analytic skill. Mr. Daw's paper was on Surgical Tuberculosis in Children, the writer being impressed by the splendid work done in the infirmary wards.

On the second day Sir William Osler, of Oxford, opened with a comprehensive view which brought us back from detailed studies to general principles. He startled the lay delegates by diagnosing tuberculosis in every palpitating breast before him and around him, and he finished a fine speech, delivered in perfect English with an occasional Americanism, by asking for a living wage for the worker, and a sober population in houses of hygiene. Dr. Cecil Wall, Physician to the London and Brompton Hospitals, spoke of the Home Treatment of Consumption among the poor of the Metropolis. He discussed only the treatment of those with limited means, and in listening to his paper one felt that the whole problem could be mastered by following Dr. Wall in his visits to the unhygienic house of the ordinary consumptive. He reflected on the unhygienic life and the insufficient food of the average working-class patient, and he criticized much of the teaching in vogue. He preferred free ventilation to a large air-space, though he asked for both; and he totally objected to impervious waterproof covers for the beds of the tuberculous. The capacity of the individual for work can be discovered only by experiment; and until that capacity has been discovered, the patient should be watched even

to a tedious extent. Dr. H. J. Campbell, Senior Physician to the Bradford Royal Infirmary, speaking of Domiciliary Treatment, believed that the chief value of a sanatorium in all but early cases was educational, and that the establishment of a cure depended upon the use made by the patient of the lessons inculcated in the sanatorium. Dr. H. W. McConnel, who knows more of after-care than any living physician, described the Kelling sanatorium system and asked for a happy combination of the voluntary and official agencies. Dr. J. E. Squire pointed to the confusion which arises when the sanatorium is expected to do the work of the Poor Law. "It frequently happens that when a patient has been discharged from a sanatorium to domiciliary treatment, an appeal for readmission is based, not an any medical necessity or advantage to the patient, but on the poverty of the home. Surely here an appeal is made to the wrong authority." Miss McCaw, of the National Council, impressed us with the advantage the voluntary dispensary held, in that the patients were treated in their homes by the medical officers of such institutions. She asked for a steady re-creation of the hygienic home by the patients themselves, and desired that nothing should be done which would destroy the self-respect of the patient requiring help. Dr. Vallow gave a second paper full of statistics, proving that in his practice tuberculin had its value. Dr. Clark, of Killingbeck Hospital, in a paper on his work as a sanatorium superintendent, deplored the number of patients who were returned to him as relapses, and he demanded a more business-like and scientific method of after-care. Dr. Dennison, Chairman of the Leeds Sanitary Committee, spoke vigorously of the obstinacy of ignorant patients who steadily refused to carry out the wishes of the medical attendant and continued to infect a house in spite of all warnings from the doctor.

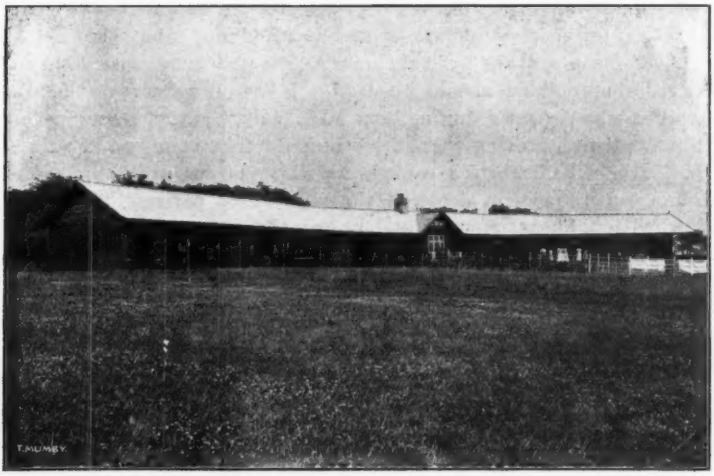
Much might be said of the visits of the delegates to the various institutions in the city, of the admirably arranged Tuberculosis Museum at the Medical School, in charge of demonstrators who did their work so clearly and so well; of the unwearying efforts of Dr. J. J. Perkins and Miss Stickland to insure perfection in the arrangements; and of the various entertainments provided by Leeds citizens for their honoured guests. But time is short, and space is precious: it is well also to leave something to the imagination. And now the writer apologizes for anything suggestive of light-heartedness in this sketch. It was, of course, written when the sky was not black. A greater calamity even than the one we are permanently at war with has come upon our people. Pray God it will pass and let us return in full vigour, all of us, all nations, to fight in a struggle in which we are all on one side.

INSTITUTIONS FOR THE TUBERCULOUS.

THE HALIFAX SANATORIUM.

DR. D. M. TAYLOR, Tuberculosis Officer for the Borough of Halifax, Yorkshire, has kindly favoured us with the following description of the new Halifax Sanatorium, situated at Shelf, near Halifax:

The Sanatorium of the County Borough of Halifax is situated at Green Lane Hall, Shelf, near Halifax. It was opened on April 8, 1914, and completes a model scheme, now in full operation, for the treatment of tuberculosis in our borough—viz.: a tuberculosis dispensary; a



THE HALIFAX SANATORIUM: GENERAL VIEW OF THE PAVILIONS.

residential open-air school, with ten beds set apart for cases of tuberculosis in children of school age; an open-air day-school for contacts and weakly children; and a sanatorium-hospital, with twenty-two hospital and twenty pavilion beds. The whole scheme is administered by the Corporation of Halifax. The population served is 101,800, with a general death-rate of 15·3 and a phthisis death-rate of 1 per 1,000. Green Lane Hall is situated about three and a half miles from the centre of the town, and is easily reached in a few minutes from the tramway termini of Halifax and Bradford. The purchase of the estate, which is over eight acres in extent, with the mansion, now used as the Administrative Block, and the cost of building and equipping the

hospital and pavilions, were partly met by the special grant provided under the Finance Act, 1911. Considerable opposition from the local District Council of Shelf was offered to the establishment, on the grounds of fear of infection, danger and injury to the milk trade, and depreciation of property. This led to a public inquiry by the Local Government Board, who, in approving the site, etc., pointed out, in a letter to the inhabitants of Shelf, that the risk of infection from a well-regulated sanatorium is very remote. The site is 750 feet above sea-level, slopes to the south, with a magnificent outlook for miles over the surrounding country, protected on the north by rising ground, is dry, well drained, and free from smoke. There is a public sewer, and the water-supply is that of the town of Bradford, abundant and pure. Being within easy access of Halifax, no increased cost is incurred by cartage, etc., and as a large number of beds are occupied by acute

THE HALIFAX SANATORIUM: THE HOSPITAL BLOCK.

cases, relatives are close at hand for visiting. The mansion on the estate has been adapted for administration, the nursing (three trained nurses, two assistant nurses, two probationers) and the domestic (five in number) staffs. There is also a resident gardener at the Lodge, and a porter. The Medical Officer has a separate house in the grounds. A short distance in front and to the left of the Administrative Block are erected the pavilions, crescentic in form, and facing south by south-west. They provide accommodation for ten males and ten females in double-bedded wards, separated by a nurses' duty-room, and each side has its own w.c., lavatory, bath-room, and cloak-room. The cases treated in the pavilion are early stages or afebrile later stages—*i.e.*, cases who are able to look after themselves, do walking exercise or work. The meals are served in the dining-hall, formerly the billiard-room, behind the mansion, and the men and women reach this by

separate paths through the intervening grounds. The stables and some outbuildings behind the mansion were partly demolished and converted into the Hospital Block, for acute or advanced or other cases needing observation, nursing care, and attention. This block consists of two wards, separated by a ward-kitchen and store-room. There are ten beds, male and female, in each ward, and at the eastern and western ends of the block are two small isolation wards connected by a passage to the main wards, and also possessing a separate entrance in the rear. There are the usual annexes for sanitary, nursing, and bathing purposes. Paths have been made in the fields in front of the pavilions, and afford facilities for walking exercises. The grounds contain plantations, kitchen garden, orchards, ornamental gardens, etc., and provide many suitable varieties of graded work for the patients.

NOTICES OF BOOKS.

THE AFTER-HISTORY OF CONSUMPTIVES.

THE reports of most sanatoria lack adequate data regarding the subsequent record of their patients. No statements respecting the value of methods of treatment can be considered of much value unless they include evidence as to the after-history of each case subjected to treatment. An interesting account of the after-history of cases treated at the Frimley Sanatorium has recently been published, and merits careful study.[1] The records are summarized in a series of thirty-six tables. They deal with 1,674 patients, who, during each year following their discharge, have been—(*a*) "well and able to work"; (*b*) "alive"; (*c*) "known to be dead"; (*d*) "lost sight of." In each year patients in whose sputum acid-fast bacilli were found have been tabulated separately from those in whose sputum such bacilli were not present. The records show that of 690 patients 55·9 per cent. were well and able to work at the end of the fourth year following that in which they were discharged, or 44·5 per cent. if only those are taken in whose sputum tubercle bacilli could be found. At the end of the fifth year, of 292 patients, the corresponding figures were 48·4 per cent. and 38·8 per cent. respectively. It is explained that all cases were specially selected, "a great majority have first passed through the wards of the Brompton Hospital in London, whence, if found suitable after a period of observation, they have been drafted on to the Sanatorium." The report concludes that the results "compare not unfavourably with those relating to the German sanatoria, in which patients are treated under the provisions of the Invalidity Insurance Law." A note of disappointment is sounded: "In view of the careful selection of cases for the Frimley Sanatorium, it was hoped that a larger percentage would have retained their health." But it is added that "it must be remembered, however, that in many cases the patients have not had work to return to after leaving the Sanatorium, and too often this has meant a return to unsatisfactory home conditions and insufficient food, with consequent relapse." It is candidly admitted that "it sometimes happens that patients who have left *in statu quo*, or 'not so well,' will be found well and able to work some years later." This, of course, is the most instructive group of all, and we could have wished that the report had analyzed these in detail. There is much to discuss and dispute in these interesting and suggestive tables, and we trust this careful report will stimulate other sanatoria to study their records. Why did not the compilers of this volume submit their statistics to Professor Karl Pearson or some other biometrician for criticism before accepting the responsibility of publication?

[1] "Report on the After-Histories of Patients discharged from the Brompton Hospital Sanatorium at Frimley, in Surrey, during the years 1905-1910." By S. H. Habershon, M.A., M.D., F.R.C.P., F. J. Wethered, M.D., F.R.C.P., P. Horton-Smith Hartley, C.V.O., M.A., M.D., F.R.C.P., J. J. Perkins, M.A., M.B., F.R.C.P., Physicians to the Brompton Hospital and Visiting Physicians to the Sanatorium, and W. O. Meek, M.B., Medical Superintendent of the Sanatorium. Pp. 48. Aldershot: Junior Army and Navy Stores, Ltd. 1914. Price 2s. 6d.

AIR AND TUBERCULOSIS.

In connection with the Washington Meeting of the International Congress on Tuberculosis, the Smithsonian Institution for the Increase and Diffusion of Knowledge among Men offered a prize for the best treatise on the "Relation of Atmospheric Air to Tuberculosis." The essays were submitted to a representative Committee of Award, and on their recommendation the prize of $1,500 was divided equally between Dr. Guy Hinsdale and Dr. S. Adolphus Knopf. At the request of the Smithsonian Institution Dr. Hinsdale has revised his essay, incorporating the record of advances made during the past five years. The monograph is a notable addition to the modern literature of tuberculosis.[1] In clear and attractive form Dr. Hinsdale presents a scientific statement of the essentials of the so-called "open-air" treatment of tuberculosis. He describes in detail the properties and effects of atmospheric states, the influence of marine, inland, and mountain air, and also explains the rôle of increased atmospheric pressure and the place of breathing exercises. There are also important sections dealing with fresh-air schools, and exercise and graduated labour in the management of the tuberculous. Medical superintendents of sanatoria may get many helpful suggestions from the chapter on accessories for fresh-air treatment of tuberculosis. The work has been carried out with much thoroughness, and almost every page is supplied with valuable references. But where all is excellent it may be permissible to add that not the least attractive and valuable feature of the work is the splendid series of photographic reproductions. These alone make the work one which every tuberculosis officer should possess.

A TUBERCULOSIS HANDBOOK.

Health visitors, district nurses, and other social workers, now realize that tuberculosis is a medico-sociological problem which they must understand at least in its essential outlines if they are to be capable in rendering effective service. Dr. A. H. G. Burton has endeavoured to provide a reliable manual for such workers.[2] As he well says in his preface, "It is to be regretted that so few opportunities exist at present for nurses to acquire a practical knowledge of the subject, and the courses of instruction existing at a few chest hospitals might be widely extended." This book affords an indication of the lines on which helpful instruction might be given. It explains the nature of tuberculosis, indicates the channels of infection, details the symptoms of course and treatment of consumption. There is a concise outline of sanatoria management. In such a book the description of artificial pneumothorax seems out of place. The concluding chapter on legislation and tuberculosis might have been extended with advantage. The illustrations are helpful.

[1] "Atmospheric Air in Relation to Tuberculosis." By Guy Hinsdale, A.M., M.D., of Hot Springs, Virginia, Secretary of the American Climatological Association. Pp. x+136, with 93 plates. Publication No. 2,254 of the Smithsonian Miscellaneous Collections. Vol. 63, No. 1. Washington, U.S.A.: The Smithsonian Institution. 1914.

[2] "The Tuberculosis Handbook for Health Visitors and Nurses, also for the Use of Social Workers, Heads of Families, and Others." By A. H. G. Burton, M.D., D.P.H., Tuberculosis Officer, Metropolitan Borough of Deptford. Pp. viii+58. London: The Scientific Press, Ltd. 1914. 2s. 6d. net.

THE OPEN-AIR SCHOOL.

Open-air treatment and education are not co-ordinated on scientific lines. Doctors and teachers are rightly co-operating to secure rational conditions of life and thought whereby children may be given the best chance of resisting disease, and when attacked regaining health. Mr. Broughton has written a helpful little book on the principles and practice of the open-air school.[1] It is mainly intended for teachers, but contains much that will be of service to medical advisers and nurses. The first part deals with questions of organization, while the second details matters connected with the curriculum. Lady St. Helier, in her sympathetic foreword, declares that "this little book contains all that is worth knowing about open-air schools," and without endorsing so sweeping a pronouncement we may safely commend it as a conscientious and highly successful endeavour to present essentials in a way which will be acceptable to educationists. The book is well illustrated.

HORMONE THERAPY.

Recent studies have thrown much new light on the influence of internal secretions in normal and morbid processes, and "Opothérapie" now occupies a foremost place in therapeutic measures. Dr. Harrower has recently published a monograph dealing fully with all aspects of the functions and relationships of the endocrinous organs.[2] His work is a complete treatise on modern hormone therapy. It is a book which we would specially commend to the notice of all tuberculosis officers and those responsible for the medical direction of sanatoria. Dr. Harrower directs attention to the occurrence of endocrinous inactivity and derangement in tuberculosis. With regard to the administration of cod-liver oil, he suggests that its place might be taken by a more palatable fat, with pills or capsules, of the extracted lecithides. He also points out that adrenal extracts or adrenalin is sometimes of value in tuberculosis. A preparation of extracts of spleen, liver, and pancreas, the author contends, has been of service in improving the condition of "a number of consumptives in whom the nutritional element was the most discouraging feature." The volume, on every page, indicates far-reaching research. To each chapter are appended valuable references. There is also a helpful Glossary of Terms, a General Bibliography, and an Organo-Therapeutic Dose-Table. The book is excellently got up.

MANUALS FOR MEDICAL PRACTITIONERS, AND WORKS OF REFERENCE.

The King Edward VII. Welsh National Memorial Association, the headquarters of which is at Cardiff, has already accomplished

[1] "The Open-Air School." By Hugh Broughton, B.Sc., with a foreword by Lady St. Helier. Pp. 188, with illustrations. London: Sir Isaac Pitman and Sons, Ltd. 1914. Price 2s. 6d. net.

[2] "Practical Hormone Therapy: A Manual of Organo-Therapy for General Practitioners." By Henry R. Harrower, M.D., sometime Professor of Clinical Diagnosis, Loyola University, Chicago. With Foreword by Professor Dr. Artur Biedl of Vienna. Pp. xix+488. London: Baillière, Tindall and Cox. 1914. Price 15s. net.

noble service for the Principality. The new report just issued[1] is a remarkable record of work already completed and designs projected or in course of being. The volume is well illustrated, and presents pictures of the proposed sanatoria buildings of the South Wales Sanatorium at Pontywal, Talgarth, near Brecon, and the proposed establishment at Plas Llangwyfan, near Llanrhaiadr, Denbigh, North Wales. The Medical Director, Dr. Marcus Paterson, has issued two tracts for patients, one to be read on entering a sanatorium, the other to be pondered when discharged "fit for work."[2] These summarize in clear-cut English the truths which every sensible patient should fully understand if he is to co-operate loyally and reasonably to further his own cure. These booklets are to be commended to the notice of medical superintendents of sanatoria and all tuberculosis officers.

"Exercise being one of the most important factors in the treatment of consumption, it follows that the method by which it is exhibited should allow of the most exact graduation and the finest adjustment to individual requirements." So says Dr. Etlinger in a well-arranged and explicit manual of exercises provided for the use of patients at the Pinewood Sanatorium.[3] This little "code book," as it is called, should be helpful to many medical superintendents in systematizing physical exercises for their patients.

In another portion of this Journal Dr. W. E. Cooke describes the essentials and meaning of the so-called "Arneth Count." He has fully dealt with this interesting adjunct to the clinical study of tuberculous and other cases in a valuable monograph which we commend to the notice of all medical superintendents of sanatoria.[4] It would be well if they could arrange for a systematic carrying out of the method first described by Arneth in his "Die Neutrophilen Leukocyten bei Infektions-Krankheit," first published in 1904.

Reference may here be made to a new journal, *The Nurse*, which will be found of much practical service to those engaged in professional nursing.[5]

[1] The King Edward VII. Welsh National Memorial Association (the Prevention and Abolition of Tuberculosis): Second Annual Report for the year ending March 31, 1914. Memorial Offices, Westgate Street, Cardiff.

[2] King Edward VII. Welsh National Memorial Association: "The Treatment of Pulmonary Tuberculosis—Words of Advice and Explanation to Patients entering a Sanatorium," and "Advice to a Patient who leaves a Sanatorium Fit for Work." By Marcus Paterson, M.D., Medical Director. Cardiff: Memorial Offices, Westgate Street. 1914. Unpriced.

[3] "Code Book of Swedish Gymnastic Exercises." Arranged by F. Kincaid Etlinger, Medical Superintendent of the Pinewood Sanatorium, and F. G. Taylor, Member and Examiner N.S.P.E. Publishers not given. 1914. Unpriced.

[4] "The Nuclear Changes in the Neuibophile Polymorphonuclear Leucocyte in Pulmonary Tuberculosis," by W. E. Cooke, M.B., M.R.C.P.E., D.P.H., Medical Superintendent, Ochil Hills Sanatorium and Coppins Green Industrial Sanatorium. Pp. 52, with plates and bibliography. Glasgow: Gilmour and Lawrence, Ltd., 2, West Regent Street. 1914.

[5] *The Nurse* is published monthly by *The Nurse* Publishing Company, Jamestown, New York.

PREPARATIONS AND APPLIANCES.

REQUISITES FOR THE SANATORIUM.

MANY excellent forms of receptacle for sputum are now available, in shapes and sizes and at prices to meet the needs of all classes. Messrs. William Seelig and Co. have sent us specimens of various forms of "Spitting Flask manufactured according to the directions laid down by Dr. Dettweiler."[1] These are of excellent workmanship and effective design. We gather, however, that they are "made in Germany." There is reason to believe that a considerable number of the sputum flasks used by better-class patients in this country are not of British manufacture. We trust English makers will realize the importance of providing all requisites for sanatoria of the best patterns and of first-class construction. Up to recently it has not always been possible to get all equipment for sanatorium work from home sources.

Dr. Robertson, Medical Officer of Health for the City of Birmingham, has arranged with Messrs. Matthew J. Hart and Sons for the construction of a sterilizer suitable for the disinfection of sputum flasks in sanatoria. The appliance is made of copper, tinned inside, with steam tubes and connections. There are four galvanized trays, each holding some thirty cups. This effective apparatus should greatly facilitate the sanitary work of sanatoria.[2]

Dr. Cooke, Medical Superintendent of the Ochil Hills Sanatorium, has devised a special form of outfit for the administration of contratoxin. It is known as the "Sterando" Contratoxin Outfit, and provides the medical practitioner with all requisites for the scientific use of contratoxin and other sera and vaccines. The syringe, which is made of glass and metal, is graduated in half-cubic-centimetres, and it can be readily taken to pieces, cleaned, and sterilized.[3]

Everyone connected with sanatoria, or responsible for the management of an open-air school, knows that even the open-air life, beneficial as it is in many ways, is not without its disadvantages. Perhaps the chief of these arises from the invasions of flies, gnats, mosquitoes, and the like. These often infest balconies and shelters, and are very difficult to deal with. In attacking these pests the Radium Spray will be found particularly effective. It is a strong, cleverly-constructed, easily-worked spray which anyone can use with a minimum of trouble. The spraying fluid, which is of special composition, possessing disinfectant and

[1] Particulars of these Dettweiler Sputum Flasks may be obtained from Messrs. William Seelig and Co., 19, Fore Street, London, E.C.

[2] Full particulars regarding the new Copper Sterilizer for sterilizing sputum cups may be obtained from the manufacturers, Messrs. J. Hart and Sons, Great Barr Street, Birmingham.

[3] The makers of the "Sterando" Contratoxin Outfit are Messrs. Anderson and Whitelaw, Broad Street Corner, Birmingham, from whom all particulars can be obtained. The price complete is 30s.

aromatic properties, is non-poisonous, causes no damage to fabrics, and can be applied without fear to any materials.[1] We believe this simple contrivance will be a boon to many sanatoria.

HELIOTHERAPY.

In the issue of this journal for January last was inserted an important article regarding the heliotherapeutic measures carried out by Dr. Rollier at Leysin. Numerous investigations have conclusively proved that exposure to sunlight and ultra-violet rays exercises a remarkable influence on many cases of tuberculous disease. It would seem that where mountain sunlight cannot be obtained good results follow the use of the ultra-violet rays of a new form of Quartz Lamp.[2] This so-called "Artificial Mountain Sun" has, according to the evidence of many writers, proved very effective in dealing with various forms of tuberculosis, especially those of "surgical" type. In the Quartz Lamp, mercury vapour contained in a transparent vacuum tube of fused crystal (Quartz) is brought to a very high temperature by an electric current, thus creating a light of great intensity. It has long been known that the mercury vapour arc emits chemically active rays (ultra-violet rays) in large quantities, exactly as in the case of the iron arc vapours of the iron light. In the ordinary mercury vapour lamps constructed of so-called uviol glass, the greater part of the ultra-violet rays is absorbed by the glass envelope, and the rays allowed to pass through are only suitable for treatment requiring weak ultra-violet light. With the Quartz Lamp the result is different; fused quartz not only allows the ultra-violet rays, which are of the greatest importance in light therapeutics, to pass through it unimpeded, but also permits the mercury vapour to be brought to a very much higher temperature than is possible in glass tubes, since fused quartz retains its hardness at a temperature at which ordinary glass not only softens but even becomes liquid. As the result of the extremely high temperature, however, the quantity of ultra-violet rays emitted by the mercury vapour increases very considerably, and thus it is possible to produce a lamp which far surpasses any other known source of light as regards its healing power. This treatment deserves thorough testing in British sanatoria.

[1] Full particulars regarding the Radium Spray can be obtained from the Radium Cleanser Company, Ltd., 101, Bunhill Row, London, E.C.

[2] Monographs descriptive of the new Quartz Lamp and its action in tuberculous and other cases can be obtained on application to the Original Quartz Lamp Company, 62, Red Lion Street, Clerkenwell, London, E.C.

NOTES.

WAR.

WAR governs all. The great campaign in which we are engaged is the supreme interest, the ruling factor; it occupies attention, dictates action, and holds us all in its sway. But while no sympathy and no support will be denied to those who wage war for the protection of the Empire and the maintenance of world-wide liberty, it is essential that the medico-sociological needs of the nation should not be neglected. Workers in the anti-tuberculosis crusade are accustomed to the terminology of war, and they will recognize that this is a time when their services must be increased rather than be allowed to slacken. Foolish and selfish people have already advocated an arrest in the activities of the tuberculosis movement. Such short-sighted policy must be strenuously resisted. Judging from experience in other times of national distress, it is safe to prophesy that there will be a considerable increase in the number of necessitous tuberculous cases at all ages. Among our sailors and soldiers there will inevitably be many requiring sanatorium treatment. The heavy strain, long exposure and physical ills to which they must be subjected, will undoubtedly kindle slumbering foci of tuberculous trouble. Even among the most vigorous, the continuous wearing of a lengthy and severe campaign must bring about states predisposing to tuberculous infection. The conditions of our sailors during winter days and nights in ships and submarines, our soldiers having to submit to inclement weather and many deprivations, and not a few prisoners long confined in, it may be, non-hygienic camps or habitations, must make us pause before we talk of lessening or limiting our accommodation for the open-air management of patients. And a word of caution may be permitted here. Many in their praiseworthy desire to give of their best to aid the wounded and sick of our brave defenders have offered country mansions, educational establishments and other non-medical buildings to be used for hospital purposes. It is perfectly clear that the best hygienic conditions cannot be maintained in many of these centres. Dr. Robert Saundby, in a recent communication on "Open-air Hospitals in War-Time," has urged the importance of arranging for adequate open-air treatment: "The campaign in favour of fresh air and sunlight is also that of efficiency and economy; and where, as has been pointed out by high authority, money may in the end be the decisive factor in this great struggle, there can be no justification for wasting it, especially when better results may be obtained by cheaper methods." And for the sake of the civilian population it is essential that the tuberculosis campaign should be maintained in full fighting force. Much poverty and consequent distress must prevail among considerable members of the community during the coming winter, and we must remember that deprivations of life's essentials is but the precursor of disease. The stress and strain will fall first and throughout most heavily on the

women and children. And yet these are those who in the highest and most fundamental interests of the nation must be conserved to the uttermost. Mr. Sidney Webb, in a valuable tract on "The War and the Workers," urges very truly that among the works of public utility which it is our duty to maintain and extend are sanatoria for the tuberculous. He says: "In some places plans and schemes for these are being suspended, and it is even alleged that the officers of the Local Government Board and Insurance Commission are delaying sanction for them, in order to save money!" We sincerely trust that this is not to be the case. Tuberculosis officers in many centres are inaugurating valuable work, but in some districts officers have had to take up military or other duties. In many of our large centres there are experts in tuberculosis and physicians who have specially devoted themselves to the study and care of chest cases. We would urge that the services of such should now be rendered available by their appointment as consultative tuberculosis officers in connection with local tuberculosis schemes. The present is no time for lack of faith or want of courage. And he who would serve his country faithfully and effectively must be prepared to maintain at their highest standard all measures directed to the prevention of distress and disease, and their immediate amelioration and arrest when and wherever and among whomsoever they may arise.

A personal reference may be permitted here. The BRITISH JOURNAL OF TUBERCULOSIS with the present issue completes its eighth volume. It is the only journal published in the British Empire which is devoted solely to the tuberculosis problem. Every endeavour will be made to make it more worthy of the cause it seeks to serve. We always welcome suggestions, and at this critical juncture in our nation's history the sympathy and support of all concerned for the prevention and arrest of tuberculosis is earnestly invited. We recognize that a period of unexampled anxiety has to be faced. We are anxious to render the fullest service which is in our power, and to this end we seek the co-operation of all workers in the tuberculosis movement. Needless to say we sincerely trust that no single subscriber will think of withdrawing his support at this critical time.

It will greatly help in the maintenance of this journal as the representative organ in the tuberculosis campaign if medical officers of health, tuberculosis officers, school medical officers, medical superintendents of sanatoria, and all medical advisers, will not only procure the BRITISH JOURNAL OF TUBERCULOSIS for their own study, but will also circulate it among those interested in all medico-sociological aspects of the tuberculosis question.

YEAR-BOOKS AND TUBERCULOSIS.

The outbreak of war has unfortunately made it impossible to issue, at the dates arranged, the two important Year-Books which will, it is believed, prove invaluable to tuberculosis officers and all engaged in the Anti-Tuberculosis Campaign. "The Year Book of Open-Air Schools and Children's Sanatoria" will be issued immediately (price 7s. 6d. net). It contains an editorial review of recent work, a considerable number of original communications, descriptions of various schemes for open-air education and treatment, and signed notices of the chief open-

air schools and sanatoria for children available in this country. This volume should be in the hands of every education authority, tuberculosis officer, and school medical officer. Volume II. of "The Tuberculosis Year-Book and Sanatoria Annual" is in an advanced condition, and will be issued as soon as circumstances will allow. It will be similar in form and arrangement to last year's volume, but all information will be thoroughly brought up to date, and the special articles will be new. Any sanatorium which has not already forwarded full particulars should do so at once. Both the Year-Books are published by Messrs. John Bale, Sons and Danielsson, Oxford House, 83-91, Great Titchfield Street, Oxford Street, London, W.

RECORDS OF PROGRESS.

Dr. Halliday Sutherland, President of the London Tuberculosis Society, informs us that in 1910 a small clinical society was formed in the Metropolis, whose members, for the most part, were medical officers to tuberculosis dispensaries and to sanatoria. The rapid development of the tuberculosis service throughout the country led to the formation of a larger society in 1912. The society holds meetings in London on the third Saturday of every month from October to June, with three provincial meetings during the session. It is proposed that the Annual Meeting shall be held at the same time and place as the Annual Conference of the National Association for the Prevention of Consumption. The Hon. Secretary of the Society is Dr. W. O. Pitt, 66, Upper Walthamstow Road, Walthamstow, Essex, to whom inquiries may be addressed. The subscription is 10s. per annum.

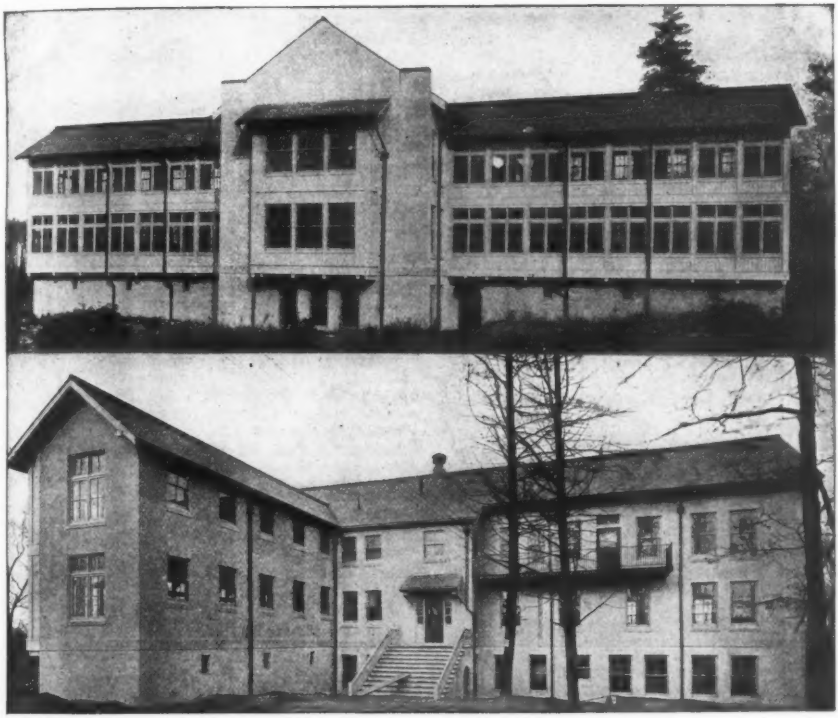
A memorial in the following terms has been submitted by the Tuberculosis Society to the Chancellor of the Exchequer and to the President of the Local Government Board:

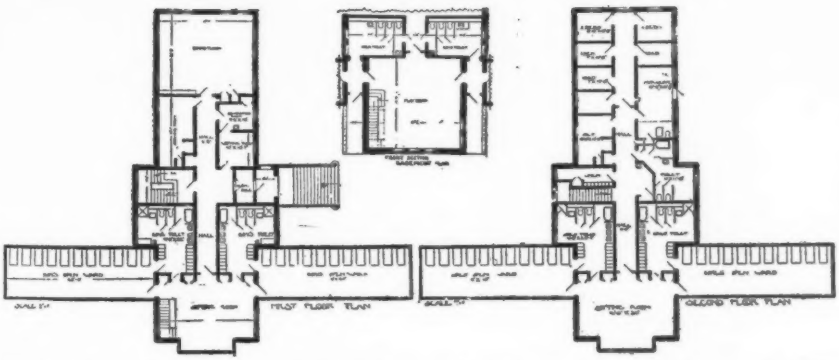
"Your memorialists represent the Tuberculosis Society. The Tuberculosis Society is a body including in its ranks tuberculosis officers appointed to County Councils, County Borough Councils, and the Metropolitan Borough Councils in England, and to County Councils and Town Councils in Scotland, and also Medical Officers to sanatoria, farm colonies, and hospitals for advanced cases. The newly constituted tuberculosis service consists of medical men engaged in the diagnosis, treatment, and prevention of tuberculosis under public bodies. For the proper discharge of the duties which recent legislation in relation to tuberculosis demands, special training and experience are essential. An endorsement of the view that tuberculosis officers should be specialists in the work is to be found in the recommendations of the Departmental Committee on Tuberculosis, 1913. The Local Government Boards have endorsed generally the recommendations of the Departmental Committee, and proceeded on the view that these officers are to be regarded as an independent service, so far as their clinical duties are concerned, and shall be responsible for the management of institutions to which they are attached. It seems to your memorialists most important that from the outset a satisfactory status and security of tenure should be insured. Without this it will be difficult to induce the best class of men to enter a service for which years of special training are required. Your memorialists consider it necessary to emphasize the fact that the tuberculosis service is mainly clinical in its duties, and does not therefore naturally lead on to transference to the ordinary administrative posts in the public service. To regard the tuberculosis service as a subsidiary branch of the public health service would be to discourage special training in a department which constitutes one of the largest fields in clinical medicine. In some other departments of State medicine, such as the lunacy and prison service, security of tenure and superannuation have been insured for officials of the same standing as members of the tuberculosis service. A claim for the extension of such treatment on the part of Medical Officers of Health and Sanitary Inspectors has recently been submitted to and friendly

received by the Treasury and the Local Government Board. Your memorialists respectfully submit that the tuberculosis service has a similar claim to security of tenure and to superannuation, and that such a claim is in the highest interest of an important public service, and is entirely reasonable in respect of those who have entered or may enter this special department."

The accompanying illustrations indicate the chief features of the new Children's Ward of the Consumptives' Hospital Department of the City of Boston, the office of which is at 926, Tremont Building, Boston, U.S.A. We are indebted to the courtesy of the Superintendent, Dr. Simon F. Cox, for the loan of the blocks. The following reference to tuberculosis in childhood appears in their Eighth Annual Report: "In most instances infection takes place in early childhood, and because of its insidiousness and the indefinite symptoms the disease is often not recognized. Obviously our aim should be to prevent fresh victims from being constantly added to the number of consumptives while we are caring for those already infected. Children living in congested districts of the city in close contact with parents or others infected with the disease run little chance of escaping infection. It seems a fair conclusion that so common is the exposure, and the consequent dangers of infection so great, that our only hope of protecting the child is through the building up of his bodily resistance. The aim of the preventorium is to remove young children from the homes where tuberculosis exists, and through a carefully regulated life in the open air, with abundant nutritious food, to increase the resistance."

The National Association for the Prevention of Consumption and Other Forms of Tuberculosis (Hon. Secretary, Dr. J. J. Perkins, 20, Hanover Square, London, W.) held its Sixth Annual Conference at the University, College Road, Leeds, on July 7 and 8, 1914. The Volume of Transactions has recently been issued (price 5s., post free), and contains material which will be of much service to all students and workers in the tuberculosis movement. The chief addresses and communications deal with the House in Relation to Tuberculosis; Tuberculosis, especially Surgical, in Childhood; and Domiciliary Treatment. An interesting series of illustrations accompany the account of Sir William Younger's opening address. Of those taking part in the proceedings special reference may be made to the communications of Sir William Osler, Sir Robert Philip, Mr. H. J. Gauvain, Mr. Harold J. Stiles, Dr. J. Edward Squire, Dr. Nathan Raw, Dr. T. D. Lister, Dr. Harold Vallow, and Dr. H. de Carle Woodcock. The value of the Transactions would have been much increased if an index had been added. While it is desirable at these Annual Conferences to have certain subjects for special discussion, it is certainly unwise not to make the programme sufficiently elastic to include communications on new aspects of the tuberculosis campaign. We think these Annual Meetings should be somewhat of the nature of a review of all important forms of work bearing on tuberculosis during the past twelve months, with indications of lines requiring special investigation or collective inquiry.





NEW CHILDREN'S WARD OF THE CONSUMPTIVES' HOSPITAL DEPARTMENT OF THE CITY OF BOSTON, U.S.A.

Four wards, twelve beds each. Four rooms with one bed each. Two rooms with two beds each. Nursery with six cribs. Dining-room. Playroom. Schoolroom.

INDEX

Adams, Alfred, induced pneumothorax in pulmonary tuberculosis, 96
ADENITIS, tuberculous, 70
ADOLESCENT, health of the, 46
ALBUMIN reaction of sputum, 217
ALPINE climate, 32
ANTI-TUBERCULOSIS movement, 73
ARNETH count in pulmonary tuberculosis, 211
ARTHRITIS, tuberculous, 67

BACILLUS, bovine, 83
BED-SCREEN, 53
BLACK FOREST, 35
BONE, tuberculous, 208
BOOKS, notices of, 43, 112, 175, 231
BOVINE tuberculosis, 206
Bullock, J. E., scrofulosis and tuberculosis, 88

CAMP, open-air, 108
Campbell, Thompson, the organization and administration of tuberculosis work in rural districts, 102
Carling, Esther, tuberculosis in children, 151
CHILDHOOD, surgical tuberculosis in, 203
CHILDREN, protection of, 82
— tuberculosis in, 151
— tuberculous infection in, 205
CLIMATE, Alpine, 32
CONSUMPTIVE pavilions, Edinburgh City Hospital, 40
CONSUMPTIVES, garden villages for, 21
Cooke, W. E., the Arneth count in pulmonary tuberculosis, 211
CRIPPLE children, home for, 171
Crossley, Leonard, the work of a county tuberculosis officer, 105
Cullen, J. A. Patrick, X-ray work in a tuberculosis dispensary, 142

DAVOS, 32
Delépine, Sheridan, the milk-supply as a causal factor in relation to tuberculosis, 195
De Voss, Emilia Kanthack, heliotherapy in surgical tuberculosis, 63
DIRECTORY, tuberculosis, 43
DISINFECTION of tubercle-infected houses, 147
DISPENSARIES, equipment of tuberculosis 30
— tuberculosis, 28, 105, 142
DOUSLAND GRANGE Sanatorium, 137
DUST, tuberculous, 147

EDINBURGH City Hospital, 40
— tuberculosis among children in, 206
EMBRYONALISM, 91
Esslemont, J. E., a garden village for consumptives, 21
EXHIBITIONS, tuberculosis, 139

Ferguson, J. Bell, future of the tuberculosis dispensary, 28
FOREST schools, 130
FORMALDEHYDE disinfection, 150
FORMALIN disinfection, 183
Fraser, John, tuberculosis in early life, 16
FUMIGATORS, 54

GARDEN cities, 22
Gauvain, H. T., heliotherapy in surgical tuberculosis, 63
GERMANY, prevention of tuberculosis in, 113
— sanatoria in, 2
GLAN ELY Hospital, 135
GLANDS, tuberculous, 207
Glover, E. G., the "albumin reaction" of the sputum in pulmonary tuberculosis, 217

HALIFAX Sanatorium, 228
HEALTH visitors, 15
HELIO-THERAPY, 44, 63
HERTFORDSHIRE, tuberculosis scheme for, 26
Hewat, A. Middleton, the disinfection of tubercle-infected houses, 147
HIP disease, 210
HOSPITALS, consumption, 10
HOUSES, tuberculous, 147
HOUSING, hygienic, 79

I.K., Spengler's, 45, 178
IMMUNITY, 76, 85
INFECTION and immunity, 76
— tuberculosis, 16
INSOLATION, 64
INSTITUTIONS for the tuberculous, 32, 108, 168, 228

INSURANCE and tuberculosis, 3, 8

Jacobs, Henry Barton, the double red cross tuberculosis emblem, standardized, 5
Jacobson, Arthur C., genius and tuberculosis, 163
JOINTS, tuberculous, 208

KING EDWARD VII. Welsh National Memorial Association, 135
Knaggs, R. Lawford, surgical tuberculosis in childhood, 203

LEEDS, Tuberculosis Conference at, 224
LEYSIN, heliotherapeutic treatment at, 63
LYMPHATISM, 90

MANCHESTER, milk-supply in, 195
MANUALS for medical practitioners, 48, 117, 179, 233
MARDY Isolation Hospital, 139
MILK-SUPPLY and tuberculosis, 195
MILK, tuberculous, 4, 77
MORTALITY rates in Manchester, 198
Much, Hans, the virulence of tuberculosis in Palestine, 19

NORTH WALES Sanatorium, 135
NOTES, 58, 128, 188, 237
NOTICES of books, 43, 112, 175, 231
NOTIFICATION, compulsory, 81
— of tuberculosis, 190
NOTTINGHAM, open-air treatment at, 168
NURSES, tuberculosis, 48, 141, 157, 159
NURSING appliances, 184
— requisites, 53, 124

OPEN-AIR treatment, 75

PALESTINE, tuberculosis in, 19
Paterson, Marcus, the tuberculosis movement in Wales, 135
PATHS of progress, 60, 133, 193, 239
Pearson, S. Vere, observations on the working of "sanatorium benefit," 8
PENHESGYN open-air home, 138
PERITONITIS, tuberculous, 69
PIGMENTATION of skin, 67
PNEUMOTHORAX, artificial, 51, 93, 96
POVERTY and tuberculosis, 81

Raw, Nathan, impressions of the Eleventh International Conference on Tuberculosis, 1
RED CROSS tuberculosis emblem, 5
RESORTS and institutions for the tuberculous, 32, 108, 168, 228
Riviere, Clive, tubercle vaccination: the protective rôle of the bovine bacillus, 83
ROBERT KOCH Society, 128
Rundle, Mary, aims and methods of the tuberculosis nurse, 159
RURAL districts, tuberculosis work in, 102

SANATORIA, 46
— for children, 154
— in Germany, 2
— schools, 155
SANATORIUM benefit, 8, 192
— Dousland Grange, 137
— Halifax, 228
— Maltings Farm, 108
— North Wales, 135
— St. Blasien, 35
— West Wales, 135
Saundby, Robert, the progress of the anti-tuberculosis movement, 73
Sayres, A. W. Fortescue, nursing organization and administration for tuberculous patients in country districts, 157
SCHOOLS, sanatoria, 155
SCOTLAND, notification in, 190
SCROFULOSIS, 115
— and tuberculosis, 88
SHELTERS, 54, 59
— open-air, 106
SOUTHAM open-air camp, 108
SPENGLER'S, I.K., 45, 178
SPUTUM, albumin reaction of, 217
STATE action in the tuberculosis campaign, 9
— medical services, 13
STETHOSCOPIC abbreviations, 130
SUNLIGHT, action of, 63

Thomson, H. Hyslop, scheme for the treatment of tuberculous cases in a rural county, 26
TOWN planning, 79
TREATMENT by artificial pneumothorax 93, 96
— open-air, 75
— sun, 63
TUBERCLE bacilli, varieties of, 16
— vaccination, 83
TUBERCULIN bottle, 52
— in diagnosis, 47
— therapy, 112
TUBERCULOSIS, bovine, 2, 4
— in children, 151
— Conference at Leeds, 224
— death-rate from, 2
— diagnosis of, 114
— directory, 43
— dispensaries, 28, 142
— in early life, 16
— Eleventh International Conference on, 1
— emblem, 5
— exhibitions, 139
— and genius, 163
— infectivity of, 74, 189
— institute, equipment of, 30
— institutions, 177
— and insurance, 3, 8
— management of advanced, 14
— and milk-supply, 195
— mortality, 200
— movement in Wales, 135
— notification of, 190
— nurses, 48, 141, 157, 159

TUBERCULOSIS officers, work of, 102, 104
— in Palestine, 19
— and poverty, 81
— scheme for Hertfordshire, 26
— and scrofulosis, 88
— studies in, 175
— surgical, 63, 203
— work in rural districts, 102
TUBERCULOUS arthritis, 67
— bones, 208
— glands, 207
— infection in children, 205
— joints, 208
— milk, 77
— patients, rules for, 159
— resorts and institutions for the, 32, 108, 168, 228

VACCINATION, tubercle, 83
VILLAGE for consumptives, 21
VISITORS, health, 15
VOLUNTARY charities, 11

WALES, tuberculosis movement in, 135
WANDER-MUSEUM, 129
WEST WALES Sanatorium, 135
Wilson, Horace, equipment of a tuberculosis institute, 30
Woodcock, Herbert de Carle, treatment of pulmonary tuberculosis by artificial pneumothorax, 93
— — the Tuberculosis Conference at Leeds, 224

X-RAY work in a tuberculosis dispensary, 142

YORK CITY Isolation Hospital, 36
YORKSHIRE, tuberculosis work in, 102

Baillière, Tindall and Cox, 8, Henrietta Street, London, W.C.

The

British Journal of Tuberculosis.

OVALTINE

AN EGG, MILK, AND MALT BEVERAGE.

THE "OVALTINE" beverage advantageously displaces routine Milk and Eggs or Malt Extract and Cod Liver Oil in Phthisis. It strongly augments the diet without burdening the patient's digestion or tolerance. It possesses peculiar value in that it is rich in those phosphatides which play so important a role in promoting anabolism and increasing the natural defensive powers of the body.

"Ovaltine" promotes healthy increase in weight, restoration in tone, and recuperation.

"Ovaltine" is supplied to the public in 1/-, 1/9 and 3/- tins.
Specially low prices are quoted to Hospitals and Institutions for bulk quantities.

"WANDER" (BRAND) MALT EXTRACT WITH IRON IODIDE

Indicated in Tubercular conditions of glands, bones and joints, Fibrositis, Interstitial Keratitis.

The "Wander" Malt Extract with Iron Iodide is pleasant to the taste, and very convenient to handle.

It does not oxidise, cause gastric disturbance, iodism or constipation, and it does not, therefore, possess the disadvantages of the official and other available forms of Iron Iodide. Each tablespoonful contains 2½ grains Ferrous Iodide.

Price 1/9 per bottle. Specially low prices are quoted to Hospitals and — Institutions for bulk quantities. —

"WANDER" (BRAND) MALT EXTRACT WITH HÆMOGLOBIN

A successful hæmatinic tonic nutritive in the form of lustrous ruby-coloured small granules, which melt readily on the tongue and are pleasant and sweet to the taste. The dose is 10 grammes (one tablespoonful) and contains 46½ grains of pure Hæmoglobin. It thus affords for the first time a means of administering Hæmoglobin in adequate dosage, and in a palatable and attractive way. It is useful in the secondary anæmia common to tuberculous and tuberculously predisposed children and young subjects.

Price 1/9 per bottle. Specially low prices are quoted to Hospitals and — Institutions for bulk quantities. —

"OVALTINE," Wander Malt Products, Formitrol, Formalin Pastiles, are made at the Company's Works at Kings Langley, Hertfordshire, entirely by British Labour and British Control. No German or Austrian capital is employed.

A. WANDER, LTD., 45, Cowcross St., London, E.C.

M52

To face inside cover

EMETINE

Hydrochlorid (WHIFFEN'S) Hydrobromid

For Hypodermic Injection.

"The New Remedy in Amœbic Disease," vide *British Medical Journal*, August 25th, 1912, pp. 405-408.

EMETINE SUCCESSFUL IN TREATMENT OF TUBERCULAR HÆMOPTYSIS.

PROFESSOR CHARLES FLANDIN, Director of the Clinic attached to the Faculty of Medicine, Paris, states (see report in *La Presse Médicale*, 24th September, 1913):

"Altogether we have collected twenty observations of hæmoptysis stopped by Emetine.

"Several among them, and one in particular, was of importance for the reason that other "treatments had been tried without success before administering Emetine, which stopped the "hæmorrhage immediately.

"Whatever may be the physiological action, the fact remains, easily demonstrable, that "Emetine Hydrochloride stops hæmoptysis."

These preparations may be obtained by ordering Whiffen's Brand, from all Chemists and Wholesale Drug Houses in the United Kingdom and Abroad.

WHIFFEN & SONS, Ltd., Battersea, London, S.W.

Telephone: 254 & 255 Battersea.

For latest reports see pamphlet, forwarded on application.

Third Edition. ***Now Ready***

Pp. viii+408. Price 5s. net

PHYSIOLOGICAL PRINCIPLES IN TREATMENT

BY

W. LANGDON BROWN

M.A., M.D. CANTAB., F.R.C.P.

Assistant Physician to St. Bartholomew's Hospital; and Physician to the Metropolitan Hospital, etc.

"In every chapter there will be found applications of physiological principles to treatment which are of the highest value in everyday practice."—*Glasgow Medical Journal.*

LONDON

BAILLIÈRE, TINDALL AND COX

8, HENRIETTA STREET, COVENT GARDEN

DON'T LICK

Postage or Insurance Stamps, Envelope Flaps, Labels, etc., but use the

HYGIENIC MOISTENER, ALL GLASS.

Price 1s., post free. AGENTS WANTED.

M. LINDNER, FARRINGDON AVENUE, LONDON, E.C.

NOW READY. Demy Octavo, Pp. viii+261, with 51 Illustrations. Price 7s. 6d. net.

THE SENSORY & MOTOR DISORDERS OF THE HEART:

THEIR NATURE AND TREATMENT.

By ALEXANDER MORISON, M.D., F.R.C.P., Senior Physician Great Northern Central Hospital, etc.

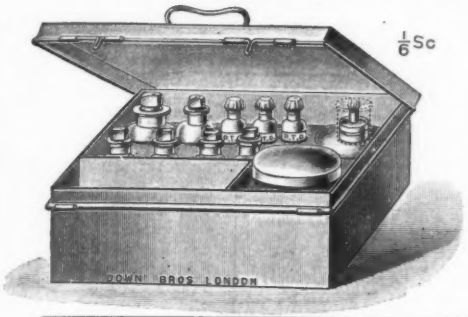
BAILLIÈRE, TINDALL & COX,

8, HENRIETTA STREET, COVENT GARDEN, LONDON.

DOWN BROS.' Specialities

COMPLETE TUBERCULIN OUTFIT

Suggested by Dr. F. MABYN REID, M.D., D.P.H.



$\frac{1}{6}$Sc

CONTAINING

Bottles for dilutions of Tuberculin and for Alcohol.

Gauze and Wool in Glass Box with Metal Lid.

All Glass Tuberculin Syringe and Von Pirquet's Lancet and Spirit Lamp.

Price £2 1s. 6d. complete

The whole fitted in neat Aluminium Japanned Box with Handle. Outside Waterproof Case also provided, **5s.** extra.

GRANDS PRIX
Paris, 1900. Brussels, 1910. Buenos Aires, 1910.

Also THE GOLD MEDAL
(Highest Award)
Allahabad, 1910.

DOWN BROS., Ltd.,

Surgical Instrument Manufacturers,

21 & 23, St. Thomas's St., LONDON, S.E.
(Opposite Guy's Hospital).

Factory: KING'S HEAD YARD, LONDON, S.E.

Telegrams: "DOWN, LONDON."
Telephones: Hop 4400 (4 lines).

SUPERSEDES COD LIVER OIL

Used in various HOSPITALS AND SANATORIUMS.

TRADE "ROBOLEINE" MARK

An Ideal Food

For Infants and Invalids

DOES NOT NAUSEATE.

Contains Red Bone Marrow, Expressed Juice of Calves' Rib Bones, "Cream of Malt," and the Hypophosphites of Lime, Soda, and Potash.

A BULWARK AGAINST DISEASE.

Manufactured in the Laboratories of

OPPENHEIMER, SON & CO., LTD.

179, Queen Victoria St., London.

FOR SANATORIA THIS IS AN IDEAL ATOMIZER.

Also in Naso-Pharyngeal and Post-Nasal Forms.

(Rogers' Laryngeal "Aquolic" Atomizer.)

IT IS ONE OF **ROGERS'**

STANDARD SPRAYS

The No. 1 Series,
The Miniature No. 1 Series,
The "Aquolic" Series,
The Pocket Series,
The "Aquol" Series.

"THE STANDARD OF PERFECTION IN MEDICAL SPRAYS."

Full particulars from the Manufacturer,

FRANK A. ROGERS,

327, Oxford Street, LONDON, W.

RECENT PUBLICATIONS

Pp. xii + 630 Price **12/6** net.

DIETETICS

OR, FOOD IN HEALTH AND DISEASE

Including a Chapter on "Vitamines and Deficiency Diseases"

By WILLIAM TIBBLES, L.R.C.P.Edin., M.R.C.S.Eng., L.S.A.,Lond., LL.D., M.D. (Hon. Causa, Chicago)

Medical Officer of Health, Melton Mowbray

The subject is dealt with in this book somewhat differently than in other works on Dietetics. It contains the results of the latest investigations on Metabolism, etc., and a chapter on "Vitamines and Deficiency Diseases," which was added after the rest of the book was in type, makes it the only work on Dietetics which can now be regarded as complete.

Pp. xx + 488 Price **15/-** net.

PRACTICAL HORMONE THERAPY

A MANUAL OF ORGANOTHERAPY FOR GENERAL PRACTITIONERS

By HENRY R. HARROWER, M.D.

Sometime Professor of Clinical Diagnosis, Loyola University, Chicago; Fellow of the Royal Society of Medicine; Fellow of the American Medical Association

With a Foreword by Professor ARTUR BIEDL, Vienna

The introduction into therapeutics of preparations containing the active principles of the internal secretions is one of the greatest achievements of modern medicine. The principal object of this book is to broaden the therapeutic horizon and to stimulate the reader to include in his armamentarium such of the hormones as are of proved utility.

SECOND EDITION NOW READY. Pp. xvi + 374, with 74 Illustrations. Price **12/6** net

PREVENTION OF DENTAL CARIES AND ORAL SEPSIS

By H. P. PICKERILL, M.D., Ch.B., M.D.S.Birm., L.D.S.Eng.

Professor of Dentistry and Director of the Dental School in the University of Otago

"A work of the highest possible interest to every medical man. Its teachings go to the very root of the treatment of countless forms of disease. It is lavishly illustrated with micro and other photographs, the bibliography is extensive and valuable, the literary style is easy and unambiguous."—*Medical Press and Circular.*

BAILLIÈRE, TINDALL & COX, 8, HENRIETTA STREET, COVENT GARDEN, LONDON

TWO EFFECTIVE ADJUVANTS
IN THE
TREATMENT OF TUBERCULOSIS

KINAZYME AND/OR SECRETOGEN

To Increase Weight and Nutrition.

KINAZYME

Is a preparation of the dried extract of spleen reinforced by similar extracts from the liver and pancreas, with the addition of a small dose of calcium lactate.

It increases nutrition and resistance to tuberculosis, and in increasing resistance causes the patient to re-act favourably to orthodox treatment (tuberculin, hygiene, etc.).

To Stimulate Normal Digestive Activity.

SECRETOGEN

Is a preparation of secretin from the pylorus and duodenum reinforced by pancreatic extract.

As most cases of intestinal toxemia are due to enzyme deficiency, and as the administration of this preparation causes an abundant flow of the digestive enzymes, its value is evident in digestive insufficiences.

IF YOU HAVE NOT YET MADE A CLINICAL TRIAL SEND FOR SAMPLES AND INFORMATIVE MONOGRAPHS.

G. W. CARNRICK CO., HORNSEY, LONDON, N.

Also Manufacturers of

TRYPSOGEN
For use in Diabetes.

HORMOTONE
For use in Neurasthenia.

HEPATOGEN
(Dessicated liver substance), for hepatic insufficiencies.

THE METABOLIST

A bi-monthly journal of progress in the study of metabolism and the internal secretions, will be sent to interested physicians

ONE YEAR FREE.

Simply send your card and mention this announcement.

Head Offices and Laboratories:
23/7 SULLIVAN ST.,
NEW YORK CITY.

London Warehouse:
6, TRAFALGAR BLDGS.,
CHARING CROSS,
W.C.

BOMBAY:
155 Juma Musjid Market.

CAPETOWN:
c/o Lennon, Ltd.

MELBOURNE:
27 Swanston Street.

READY SHORTLY. **Price 7s. 6d. net.**

THE

Year-Book of Open-Air Schools

AND

Children's Sanatoria

A COMPANION VOLUME TO THE

"Tuberculosis Year-Book and Sanatoria Annual"

Edited by T. N. KELYNACK, M.D.

THE YEAR-BOOK OF OPEN-AIR SCHOOLS AND CHILDREN'S SANATORIA will be an indispensable reference work for Medical Officers of Health, Tuberculosis Officers, School Medical Officers, and all engaged in the organization and administration of measures for the prevention and arrest of Tuberculosis and the furtherance of Child Welfare.

THE YEAR-BOOK OF OPEN-AIR SCHOOLS AND CHILDREN'S SANATORIA will contain Original Communications and Critical Surveys by well-known experts. There will be descriptions of various Schemes for the conduct of Open-Air Education, together with signed notices of Residential and Day Open-Air Schools, and Sanatoria for tuberculous and other delicate children. The Volume will contain information regarding measures and institutions for young subjects requiring Open-Air Education and Treatment, or other forms of medico-educational care and control. The Year-Book will also provide information regarding all matters relating to Open-Air Prophylactic, Therapeutic, and Educational Methods; and will be the Standard Work of Reference on all Questions relating to Open-Air Schools and Sanatoria for Children.

LONDON:

JOHN BALE, SONS AND DANIELSSON, LTD.

83, 85, 87, 89, 91, GREAT TITCHFIELD STREET, W.

CONTENTS.

ORIGINAL ARTICLES:

PAGE

The Milk-Supply as a Causal Factor in Relation to Tuberculosis. By Sheridan Delépine, M.B., C.M., M.Sc. 195

Surgical Tuberculosis in Childhood. By R. Lawford Knaggs, M.D., F.R.C.S. 203

The Arneth Count in Pulmonary Tuberculosis. By W. E. Cooke, M.D., M.R.C.P.E., D.P.H. ... 211

The "Albumin Reaction" of the Sputum in Pulmonary Tuberculosis. By E. G. Glover, M.B. ... 217

The Tuberculosis Conference at Leeds. Herbert De Carle Woodcock, M.D., M.R.C.P.E., D.P.H. . 224

INSTITUTIONS FOR THE TUBERCULOUS 228

NOTICES OF BOOKS 231

PREPARATIONS AND APPLIANCES 235

NOTES 237

DIRECTORY OF SANATORIA xvii

WANTED.—A few copies of this Journal dated April, 1909; July, 1909; October, 1909; January, 1910; April, 1910; July, 1910; and April, 1912. Will those readers who have copies to spare communicate with the publishers:

MESSRS. BAILLIÈRE, TINDALL & COX,
8, Henrietta Street, Covent Garden, London, W.C.

NOW READY. With 22 Charts. Demy 8vo., **6/-** net; post free **6/3**, abroad **6/4**.

PRELIMINARY REPORT ON THE TREATMENT OF PULMONARY TUBERCULOSIS WITH TUBERCULIN. By NOEL D. BARDSWELL, M.D., Medical Superintendent, King Edward VII Sanatorium, Midhurst. With a Prefatory Note by Professor KARL PEARSON, F.R.S.

"The whole work is one which no student of tuberculosis can afford to neglect, and all concerned in its production are to be heartily congratulated."—*British Journal of Tuberculosis.*
"Is a document of much importance."—*British Medical Journal.* "Well worth reading."—*Lancet.*

NOW READY. Demy 8vo., **5/-** net; post free **5/3**, abroad **5/4**.

I. K. THERAPY, with Special Reference to Tuberculosis. By W. E. M. ARMSTRONG, M.A., M.D.Dub., Bacteriologist to the Central London Ophthalmic Hospital; late Assistant in the Inoculation Department, St. Mary's Hospital, Paddington.

"We can commend to everyone who really wishes to understand the system of treatment."—*British Medical Journal.*

*** *Complete CATALOGUE OF H. K. LEWIS'S PUBLICATIONS post free on application.*

LONDON: H. K. LEWIS, 136 GOWER STREET, AND 24 GOWER PLACE, W.C.

INDEX
TO ADVERTISEMENTS.

	Pages
Allen & Hanburys, Ltd.	XIII
Ashover Sanatorium	XIX
Baillière, Tindall & Cox	IV, VI, IX, Page III of Wrapper
Bale, Sons & Danielsson, Ltd.	VIII
Beatson, Clark & Co., Ltd.	Page II of Wrapper
Boulton & Paul, Ltd.	XI
Bressillon & Co.	XXIII
Carnrick, G. W., & Co.	VII
Church Army Children's Sanatorium	XXI
Dartmoor Sanatorium	XXI
Down Bros., Ltd.	V
Edwards, J.	XI
Gruber, A.	XVI
Hobson, J. T., & Co.	XI
Jennings, C., & Co.	XI
Kelly, C. H.	XXIV
Lawes Chemical Co.	XVI
Lemco, Limited	Page IV of Wrapper
Lewis, H. K.	IX
Lindner, M.	IV
Medical Press and Circular	Page III of Wrapper
Nordrach in Wales Sanatorium	XIX
Ochil Hills Sanatorium	XVI
Oppenheimer, Son & Co., Ltd.	V
Pascall	X
Rogers, Frank A.	V
Rostrevor Sanatorium	XIX
School Furnishing Co., Ltd.	XV
Vale of Clwyd Sanatorium	XIX
Wander, A., Ltd.	III
Whiffin & Sons, Ltd.	IV
Wright & Sons, Ltd.	XV
Zimmerman, Chas., & Co.	XII

PASCALL'S GOLDEN MALTEX THE IDEAL FOOD SWEET

6d., 1s., and 1-lb. Bottles, of all Chemists and Confectioners.

ALSO (IN 6d. TINS) **GOLDEN MALTEX BON-BONS.**

Containing 25 per cent. of Allen & Handburys' EXTRACT OF MALT, and prepared by a special process whereby all the essential properties of the Malt are preserved.

All PASCALL'S Confections are made under Ideal Hygienic Conditions.

THE FACTORIES ARE OPEN AT ALL TIMES FOR INSPECTION.

REVOLVING SHELTERS

INVALUABLE FOR THE OPEN-AIR TREATMENT.

Strongly built from selected materials, and of a high standard of workmanship. Painted and finished in superior style. Can be very easily turned.

No. 451, as illustrated, 7 ft. by 6 ft. by 9 ft. to ridge, mounted on Revolving Gear. Cash Price, **£13.**

REVOLVING SHELTERS from £10.
SHELTERS (without Revolving Gear) from £7 5s.
Delivered in sections for easy erection.
Carriage Paid to nearest Railway Station in England or Wales.
Catalogue No. 189A "Shelters and Châlets" Post free on application.

We specialize in PORTABLE BUILDINGS OF ALL KINDS: HOSPITALS, SANATORIA, SURGERIES, STABLES, MOTOR CAR HOUSES, Etc.

Designs and Estimates free. Catalogues may be had on request.

BOULTON & PAUL, Ltd., Manufacturers, NORWICH

OPEN-AIR SHELTERS, ALSO OPEN-AIR SCHOOLS.

Send approximate particulars and we shall be pleased to estimate free.

"TEAKARD" block floorings for hard wear in Hospitals, etc. Sample on application.

Rural Housing Scheme Solved

Four-roomed cottage from £100 fixed in some districts. Samples can be seen erected near Bristol, in Wood, Iron and Wood, or Fireproof slabs, to suit requirements.

Creosoted Woodwork and Fencing of all description. Send 1s. 6d. (export, 3d. extra), for 286 page illustrated list, and 4-fold brass jointed advertisement rule.

Deal, Teak, and Austrian Oak Joinery to any dimensions. General Purpose Farm Barrows, 14s. 9d. Carriage paid to some stations, on a dozen.

C. JENNINGS & CO.,
Timber Merchants, General Woodworkers,
851, Pennywell Road, Bristol.

KEEP HEALTHY or GET HEALTHY.
USE ALWAYS THE
QUIDOS LIFE-SAVING CHAIRS,
AND SLEEP ON
Quidos Soft Cork Mattresses.
IMMUNITY FROM DISEASE GERMS,
CHILLS, AGUE, RHEUMATISM, &c

Chair has double canvas back filled in sections with special soft large air cell. Quidos Cork finest non-conductor of heat out, it is
COOL IN SUMMER, WARM IN WINTER.
Absolutely Sanitary. Washed with hose, or steamed without injury; is adjustable; back rolls round, giving always dry seat; taken off, forms **Sleeping Mattress** Very comfortable. Folding & Portable.

Price 16/6 Packing & carriage extra.

THROWN INTO WATER WILL SUPPORT A PERSON.
THE VERY SAFEST TO USE.
Send for Circulars.
SPECIALIST IN CORK GOODS.
J. EDWARDS, 81, St. Margaret's Road, TWICKENHAM.

REVOLVING SHELTERS.

Mounted on Patent Wheels with Revolving Gear and Foundation Platform.
Size 8 ft. by 6 ft.
PRICE .. **£11 10 0**
CARRIAGE PAID.
Best Materials and Workmanship.
Send for 1914 Catalogue of Shelters.

J. T. HOBSON & CO., Timber Importers,
Portable Wood Building Specialists.
Established 70 years. **BEDFORD.**
Works, 6 acres. Stock of Wood in Sheds, 10,000 tons.
Telegrams: "TIMBER, BEDFORD." Telephone, No. 34.

Lysol

FOR ASEPTIC RESULTS.

No other Antiseptic is so Generally Useful in Tuberculosis.

The Special Solvent action of Lysol on Mucus, Grease, and Sanguineous Matter, ensures removal of adherent germs and other contaminations.

Sweetens and Purifies Linen.

Refreshing and Cleansing for the Bath.

As a Dentifrice, Mouth-wash, or Gargle, use three to five drops to a tumblerful of water.

For Sputum Flasks use 5% solution.

LYSOL is now manufactured entirely in England under the analytical supervision of Ernest J. Parry, F.I.C., F.C.S., and Arthur Ling, F.I.C. Many crude coal-tar preparations are being offered as Lysol, and in order to obtain the right article see our name on every bottle and wrapper.

Of all Chemists, in Bottles at 7½d., 1/9, and 3/-

and in Special Bulk Containers for Institutions.

Sample FREE on Application.

CHAS. ZIMMERMAN & CO., (CHEMICALS) LTD.,

9-10, ST. MARY-AT-HILL, LONDON, E.C.

To face first page of text

"A perfect combination of Malt Extract and Cod-Liver Oil."—
British Medical Journal.

"BYNOL"
(Trade Mark)

"Bynol," the "Allenburys" Malt and Oil, presents the pure "Allenburys" Cod-Liver Oil in intimate association with the finest Malt Extract. It contains a very high percentage of Cod-Liver Oil, and is a valuable nutrient and digestive. Palatable and acceptable to the most fastidious, it is readily assimilated even when the digestive organs are impaired.

Special Advantages.

1.—It assures the digestion and assimilation of the Cod-Liver Oil by perfectly emulsifying it.

2.—It possesses the high diastasic powers of Malt, and thus materially aids the digestion of farinaceous foods.

3.—It is free from taste of Cod-Liver Oil and is relished both by adults and children.

"Bynol" will be found of special value to young children whose digestive powers are imperfect, and who are thin and weakly. They take and digest it readily when ordinary Cod-Liver Oil cannot be tolerated. It is invaluable in tubercular affections.

In Bottles at 2/- and 3/6 each.

☛ **Descriptive Pamphlet and Sample sent Free to Medical Men on request.**

Allen & Hanburys Ltd., Lombard Street, London.

NIAGARA FALLS, N.Y. TORONTO. BUENOS AIRES. DURBAN. SYDNEY.

To face last page of text

MEMORANDA.

EDITORIAL.—All Original Articles, Books for Review, Preparations for Notice, etc., should be sent to the Editor, Dr. T. N. KELYNACK, 139, Harley Street, London, W. (Telephone: 3684, Paddington).

Subscriptions.—The Journal is issued in January, April, July and October, and delivered post free to all parts of the world on payment of an annual subscription of **five shillings**, which should be forwarded at the beginning of each year to the Publishers, Messrs. Baillière, Tindall and Cox, 8, Henrietta Street, Covent Garden, London, W.C.

Single numbers may be obtained from the Publishers, price **1s. 6d.** net each, or by post **1s. 9d.** Cash should accompany each order.

Covers.—For convenience in binding the annual volume, cloth covers are supplied by the Publishers, post free, 1s. 6d. each.

Reprints of articles in the journal may be had at the following rates:

Number of Reprints.	Number of Pages.	Cost, including Paper as used for Journal.	Extra for Cover as used for Journal, including Printing and Stitching.
		s. d.	s. d.
12	4	4 0	3 6
	8	5 2	
	12	6 9	
	16	7 6	
25	4	4 9	4 2
	8	6 0	
	12	8 0	
	16	9 6	
50	4	5 6	5 6
	8	7 0	
	12	9 0	
	16	11 0	
100	4	7 0	7 6
	8	9 0	
	12	11 6	
	16	13 6	
200	4	8 6	10 6
	8	11 0	
	12	14 6	
	16	18 0	

If there are any illustrations in the article, one shilling for each must be added to the prices above for "making-ready."

Instructions for reprints should be forwarded to the Publishers *before* the number containing the article is issued.

Advertisements.—Application for spaces for Advertisements of Hospitals and Sanatoria, Books, Preparations and Appliances, etc., should be made direct to the Publishers, who will furnish particulars regarding scale of charges. Every care will be taken to secure a strict supervision over all advertisements, and to provide a thoroughly reliable directory for the use of medical practitioners and others engaged in the practical work of dealing with tuberculous cases.

THE NORTH OF ENGLAND SCHOOL FURNISHING Co., Ltd.,

DARLINGTON.

MAKERS OF

SCIENTIFICALLY CONSTRUCTED SHELTERS

Fixed or Revolving.

SHELTER No. 1400.

STRONG AND ARTISTIC.

SPECIALLY VENTILATED.

Price: Carriage Paid in England or Wales,

£11 : 0 : 0

Revolving Frame, wheels and axle, £2 extra.

SPECIAL ESTIMATES FOR QUANTITIES.

FULL PARTICULARS ON APPLICATION.

JOHN WRIGHT & SONS Ltd., Publishers, BRISTOL

Now Ready. THIRD EDITION, Revised. 8vo., with Sample Chart, 1s. net. Reduction for quantities.

CONSUMPTION: Treatment at Home and Rules for Living.

By H. WARREN CROWE, M.D.

"Under medical supervision, these rules will be of great assistance to the patient in regulating his life."—*British Medical Journal.* "Just the thing to recommend to a patient of some leisure who cannot be induced to go to a sanatorium."—*Hospital.*

Crown 8vo., cloth. Fully Illustrated. 2s. 6d. net.

OPEN-AIR AT HOME; or, Practical Experience of the Continuation of Sanatorium Treatment. By STANLEY H. BATES, with a Prefatory Note by Sir JAMES CRICHTON-BROWNE, M.D.

"A useful little book which doctors may recommend patients who are obliged to carry out open-air treatment at home."—*British Medical Journal.* "This work will be a boon to many."—*British Journal of Tuberculosis.*

Crown 8vo., cloth. 2s. 6d. net.

NOTES ON THE TREATMENT OF TUBERCULOSIS. By JOHN LAIRD, L.R.C.S. and P.I. The Outcome of many years' experience.

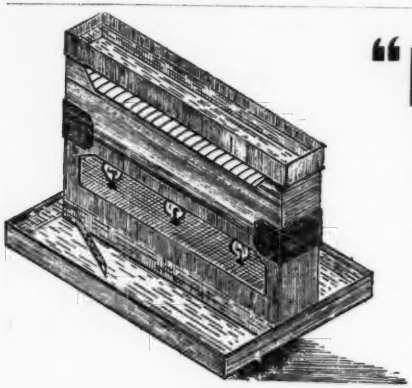
"The author sets forth his opinions with much argumentative skill. A compact little book, containing many sound observations, and much good advice."—*British Medical Journal.*

REPRINT EDITION. Just Ready. Paper Covers. 2s. 6d. net.

THE ETIOLOGY, DIAGNOSIS AND PROPHYLAXIS OF PULMONARY PHTHISIS: Considered chiefly from the Public Health point of view, with an Appendix on the Tuberculin Treatment of the Disease. By ALFRED HARRIS, M.D., Ch.B. Manch., D.P.H. Camb.; late Senior Assistant, and Deputy M.O.H., Southampton; Bact. to Southampton Corporation

"Dr. Harris's work affords a great deal of useful practical information, worthy of the attention of every one who may have to deal with tuberculous disease."—*British Medical Journal.*

BRISTOL: JOHN WRIGHT & SONS LTD.
LONDON: SIMPKIN, MARSHALL, HAMILTON, KENT & CO. LTD.



THE

"LAWESOFORM"
FUMIGATING LAMP

(PATENTED)

The "LATEST and BEST" in FUMIGATING LAMPS

The "Lawesoform" since its introduction has met with unqualified success, and is invariably described as **absolutely the best of its kind on the market.**

EACH LAMP WILL DISINFECT 1,200 CUBIC FEET.

UNIQUE FEATURES:

Its Shape and Size. (Can be carried in waistcoat pocket.)
The ingenious arrangement for evaporation of water to ensure a humid atmosphere.
Metal tray provided—no need to borrow plates or saucers.
Tablets are ***Schering's Pure Paraform***—the name is sufficient guarantee of strength. (Look for "FORMALIN" on every tablet.)
Arrangement of tablets ***in a row*** ensures ***perfect sublimation.***

Price, 9/- per dozen (reductions for quantities).

Write for further particulars and quotations to the Sole Manufacturers:

LAWES CHEMICAL CO., 59A, Mark Lane, London, E.C.

AROSA (CT. GRISONS, SWITZERLAND),

6,000 feet above sea-level.

ALEXANDRA HOTEL.

FIRST-CLASS HOUSE, enlarged and renovated 1912 English Clientele. Every modern convenience. Surrounded by Pine Woods, two minutes from the Upper Lake, close by the Skating Rink, Bob-sleigh and Toboggan Run. Large covered private Verandahs facing south with splendid view. Spacious new Hall. Cosy new Billiard Room with English Table (by Burroughes and Watts). English Fire-places in all the Public Rooms. Central Heating. Electric Light. Lift.

For Prospectus and further information apply to

A. GRUBER, Proprietor (for 10 years at the L.S.W., Railway Co.'s South Western Hotel, Southampton).

OCHIL HILLS SANATORIUM

MILNATHORT, N.B.

THIS Sanatorium, one of the finest and most beautifully situated in Europe, stands at an elevation of 800 feet in grounds of 460 acres which ascend to an elevation of 1,100 feet, and embrace woods, moorland, ornamental grounds, and a home farm.

Modern Laboratory methods and X-rays used for diagnosis, prognosis, and regulation of treatment.

It is fully and efficiently staffed and equipped with every appliance for the medical treatment, comfort, and convenience of patients.

Terms: 3½ to 4½ guineas weekly.

For particulars and Prospectus apply to THE SECRETARY or MEDICAL SUPERINTENDENT.

Telegrams: "Sanatorium, Milnathort." **Telephone: No. 9 Milnathort (P.O. Wire).**

A DIRECTORY OF SANATORIA.

This Directory of Sanatoria has been compiled to provide medical practitioners and others with a convenient and reliable reference list of private and public institutions for tuberculous patients. The Publishers will be glad to be informed of any corrections or additions.

ENGLAND AND WALES.

Place.	*Name and Address.*	*Terms per Week.*
ALTON (*HANTS*)	Lord Mayor Treloar's Cripple Home and College, Alton, Hants,	
ANGLESEY ...	Penhesgyn-y-Gors, Menai Bridge.	
AYSGARTH (*YORKS*)	Wensleydale Sanatorium, Aysgarth, S.O., Yorks.	2 guineas inclusive.
BARRASFORD ...	The Newcastle-on-Tyne and Northumberland Sanatorium, Barrasford, Northumberland.	
BEDFORD ...	Daneswood Sanatorium, Woburn Sands.	
BELBROUGHTON	Bourne Castle Open-air Sanatorium, Belbroughton, Worcestershire.	From 3 guineas.
BENENDEN ...	Sanatorium of "National Association for the Establishment and Maintenance of Sanatoria for Workers suffering from Tuberculosis," Benenden, Kent.	30s.; Beds maintained by Public Bodies and Trade and Friendly Societies.
BINGLEY (*YORKS*)	Eldwick Sanatorium, for women and children, Bingley, Yorks.	30s.
BOLTON (*LANCS*)	Wilkinson Consumption Sanatorium.	
BOURNEMOUTH	Royal National Sanatorium for Consumption and Diseases of Chest, Bournemouth.	7s. 6d. and a Governor's nomination.
	The Firs Home, Bournemouth.	
	The Home Sanatorium, West Southbourne, near Bournemouth.	3 to 5 guineas.
	West Howe, Kinson, Bournemouth.	
BRIGHTON ...	Municipal Sanatorium for Brighton Townsfolk, Brighton.	
BROADSTAIRS ...	Home Sanatorium for Children, Eastcliff House, Broadstairs, Thanet.	
BROMSGROVE ...	The Mount Sanatorium, Fairfield.	
BURY ST. EDMUNDS	Bury and West Suffolk Sanatorium.	
CHAGFORD ...	Dartmoor Sanatorium, Chagford, Devon.	3 to 5 guineas.
CHEDDAR ...	Engel Home, for gentlewomen and girls, Cheddar, Somerset.	
CHELTENHAM	Cotswold Sanatorium, near Stroud, Cheltenham.	
	Salterley Grange Sanatorium, near Cheltenham.	
CHESTERFIELD	The Ashover Sanatorium, Chesterfield, Derbyshire.	2½ to 5 guineas.
CRANHAM ...	Margaret Street Sanatorium for Children, Cranham, Stroud.	
CROYDON ...	Campbell House, Campbell Road, Croydon.	
DARLINGTON ...	Felix House, Middleton St. George, Darlington, co. Durham.	
DIDWORTHY ...	Devon and Cornwall Sanatorium, Didworthy, South Brent.	Free and by payment.
DORKING ...	Woodhurst Sanatorium (for women and girls only), Tower Hill, Dorking, Surrey.	
EVERSLEY ...	Moorcote Sanatorium, Eversley, Hants.	From 3 guineas.
FARNHAM ...	Crooksbury Sanatorium, Farnham, Surrey.	

ENGLAND AND WALES—*Continued.*

Place.	*Name and Address.*	*Terms per Week.*
FARNHAM ...	Whitmead Sanatorium, Tilford, Farnham, Surrey.	
FRIMLEY ...	Brompton Hospital Sanatorium, Frimley, Surrey.	
GRANGE-OVER-SANDS	Westmorland Sanatorium, Grange over-Sands.	2 guineas to out-county patients.
HARPENDEN ...	Sanatorium for Children of the National Children's Home and Orphanage	
HASTINGS ...	Fairlight Sanatorium, Hastings.	By subscriber's letter, 11s. 6d.; without, 17s. 6d.
HATFIELD ...	Chantrey House, Hatfield.	
HOLT	Kelling Sanatorium, Holt, Norfolk.	For poor patients
	Children's Sanatorium for the Treatment of Phthisis, Holt, Norfolk.	
HORSFORTH ...	Dean Head Sanatorium, Horsforth, Yorks.	
HULL	Hull and East Riding Convalescent Home, Withernsea, Hull.	
ISLE OF WIGHT	Royal National Hospital for Consumption, Ventnor, I.W.	10s. and a Governor's recommendation
	Hawthorn Dene, Bonchurch, Ventnor, I. W.	From 2 guineas.
	St. Catherine's Home, Ventnor, I.W.	10s. 6d. by selection.
LANCHESTER (*DURHAM*)	Maiden Law Sanatorium.	
KNIGHTWICK ...	Open-Air Treatment Sanatorium, Ankerdine Hills, Knightwick.	
LEEDS	Leeds Sanatorium for Consumptives, Gateforth, near Selby, and Leeds Hospital for Consumptives, Armley, Leeds.	Free for poor of Leeds.
LISS (*HANTS*)...	Oakshott Hanger, Hawkley.	
LITTLE BADDOW	Alfred Boyd Memorial Sanatorium, Chelmsford.	
LIVERPOOL ...	Liverpool Sanatorium for Consumptives, Kingswood, Frodsham, Liverpool.	
HESWALL (*CHESHIRE*)	West Derby, Liverpool and Toxteth Park Joint Sanatorium, Heswall.	
LLANYBYTHER	West Wales Sanatorium, Llanybyther, Carmarthenshire.	
LONDON	City of London Hospital for Diseases of Chest, Victoria Park, London, E.	
	Royal Hospital for Diseases of the Chest, 231, City Road, London, E.C.	
LONDON (HAMPSTEAD)	Mount Vernon Hospital for Consumption and Diseases of the Chest, Hampstead, London.	Free on Governor's recommendation.
LONDON (HIGHGATE)	Sussex House, Bishopswood Road. An after-care boarding-house for city workers.	From 1½ guineas
LONG STRATTON	Fritton Sanatorium, The Beeches, Long Stratton, Norfolk.	
MANCHESTER...	Hospital for Consumption and Diseases of Throat and Chest at Bowdon, Manchester, and Crossley Sanatorium, Delamere, Cheshire.	Free and by payment.
MANSFIELD ...	Ransom Sanatorium, Sherwood Forest, Mansfield, Nottingham.	Free, or 10s. on recommendation of subscribers.

VALE OF CLWYD SANATORIUM.

Opened 1901.

Terms:
£5 5s. weekly.
A few Rooms and Chalets at
£3 3s. & £4 4s.

Treatment by Tuberculin and Vaccine Inoculations.

Many miles of carefully graduated uphill walks similar to those at Nordrach, where the physician was a patient. Altitude 450 feet. Bracing Climate. Well sheltered from N. & E. winds. Small Rainfall—28 inches. Large Amount of Sunshine. Beautiful and Extensive Grounds. Electric Lighting. Careful Individual Treatment. Three hours by Rail from Liverpool and Manchester. Five hours by Rail from London.

Apply to GEORGE A. CRACE-CALVERT, M.B.,
LLANBEDR HALL, RUTHIN, NORTH WALES.

Rostrevor Sanatorium,

Near WARRENPOINT, CO. DOWN.

Specially built in 1899 on **well-sheltered** site **350 feet** above sea-level.

Numerous Verandahs and Revolving Shelters, **all provided with Electric Light.**

Main block heated by Hot-Water Pipes.

Own Dairy and Poultry Farm.

TERMS: **Three Guineas weekly.**

Res. Physician: B. H. STEEDE, M.A., M.D.
Gold Medallist, etc.,
Formerly Resident Physician Royal National Hospital for Consumption.

ASHOVER SANATORIUM,

DERBYSHIRE.

600 feet above sea-level.

For the treatment of Pulmonary Tuberculosis and other diseases.

Well sheltered, pure bracing air, lovely scenery, skilled nursing. Patients received for rest-cure and after operation.

Medical Superintendent: Dr. IDA E. FOX (R.M.O. for nearly four years at the Sherwood Forest Sanatorium).

Terms: Three to five guineas weekly.

NORDRACH IN WALES SANATORIUM

(PENDYFFRYN HALL).

FOR THE TREATMENT OF CONSUMPTION AND OTHER FORMS OF TUBERCULOSIS.

ONE of the first Sanatoria opened in the United Kingdom to carry out the Treatment of Consumption as practised at Nordrach, and a "preventorium" for suspected cases. Over 100 acres of private woods and grounds. Carefully graduated walks rise through pines, gorse, heather, to a height of over 1,000 feet above sea-level, commanding extensive views of both sea and mountains, sheltered from E. and N.E. winds. Climate mild and bracing. Small rainfall. Large average of sunshine. Rooms heated by hot-water radiators. Electric light. *Physicians:* G. MAGILL DOBSON, B.A., M.B., B.Ch.

For particulars apply to THE SECRETARY,
PENDYFFRYN HALL, NORDRACH IN WALES, PENMAENMAWR, N. WALES.

Telegraphic Address: "Pendyffryn, Penmaenmawr." ***National Telephone: No. 53 Penmaenmawr.***

ENGLAND AND WALES—*Continued.*

Place.	*Name and Address.*	*Terms per Week.*
MARGATE ..	Royal Sea-bathing Hospital (for Surgical Tuberculosis), Margate, Kent.	30s.; on recommendation of Governors, 8s. and 12s. according to age.
MENDIP HILLS	Nordrach-upon-Mendip, Blagdon, near Bristol.	3 to 5 guineas.
	Mendip Hills Sanatorium, Wells, Somerset.	From 3 guineas.
MIDHURST ...	King Edward VII. Sanatorium, Midhurst, Sussex.	2 guineas.
MUNDESLEY ...	Mundesley Sanatorium, Mundesley, Norfolk.	5 guineas.
NAYLAND ...	East Anglian Sanatorium, and Maltings Farm Sanatorium for poor men and women patients, Nayland, Suffolk.	
NORTHALLERTON	Ruebury Sanatorium, Osmotherley, Northallerton, Yorks.	From 3 guineas according to requirements (4 beds only).
NORTHAMPTON	Northamptonshire Sanatorium, Creaton.	
NORTHWOOD ...	Mount Vernon Sanatorium, Northwood, Middlesex.	30s.
OCKLEY	Ockley Sanatorium, Ockley, Surrey.	2½ guineas.
PAINSWICK ...	Painswick Sanatorium, Cotswold Hills, Painswick, Gloucestershire.	
PENMAENMAWR	Nordrach-in-Wales, Pendyffryn Hall, Penmaenmawr, North Wales.	
PEPPARD COMMON	Kingwood Sanatorium, for ladies; Maitland Sanatorium, for working-classes, Peppard Common, Oxon.	
RAMSGATE ...	St. Catherine's Hospital for Consumption.	15s.
READING ...	Boxgrove Cottage Sanatorium, Tilehurst.	
RINGWOOD ...	Linford Sanatorium, Ringwood, Hants	4 to 5 guineas.
RUDGWICK ...	Rudgwick Sanatorium, Rudgwick, Sussex.	2½ guineas.
RUTHIN	Vale of Clwyd Sanatorium, Llanbedr Hall, Ruthin, North Wales.	3 to 5 guineas.
SANDON	Merivale Sanatorium, Sandon, near Chelmsford, Essex.	3 to 6 guineas.
SHEFFIELD ...	City Hospitals for Consumptives (males), Commonside; and Crimicar Lane (females), Sheffield.	
SKIPTON	Eastby Sanatorium, for males, Skipton, Yorks.	
SLINGFOLD (*SUSSEX*)	Private Home, Warwick Lodge, Slingford, Sussex.	
STANHOPE ..	Durham County Sanatorium for men, Stanhope, R.S.O., Durham.	Free and by payment.
STANNINGTON	Children's Sanatorium, Stannington, Northumberland.	
ST. LEONARDS	Eversfield Chest Hospital, West Hill, St. Leonards.	10s. with subscriber's letter. (10 beds free Metropolitan Hospital Fund.)
SUDBURY (*SUFFOLK*)	Chilton Hill House, Sudbury, Suffolk.	
THRELKELD ...	Blencathra Sanatorium, Threlkeld, Cumberland.	

DARTMOOR SANATORIUM, Near CHAGFORD, DEVON.

Resident Physicians: C. H. BERRY, M.R.C.S., L.R.C.P., and D. L. McCULLOUGH, M.B.

Opened in 1903 for the TREATMENT OF PULMONARY AND OTHER FORMS OF TUBERCULOSIS on Nordrach Lines.

In a sheltered situation on the NORTH-EASTERN slopes of Dartmoor, 750 feet above sea-level, and close to some of the famous Tors of Devon, which here rise to over 1,400 feet. Electric Light, central heating. Special attention is given to suitable Pulmonary cases to Tuberculin Treatment by the method of Immunisation with tolerance.

For particulars apply to Medical Superintendent,
C. H. BERRY.

Terms
£3/3/0 to **£5/5/0** Weekly, according to room.

TUBERCULIN TREATMENT AT A SMALL EXTRA CHARGE.

Telegrams: "Sanatorium, Chagford."

THE CHURCH ARMY CHILDREN'S SANATORIUM,

PINE GROVE, FLEET, HANTS.

For EARLY STAGE Pulmonary Tuberculosis. Tuberculin Treatment in suitable cases. Skilled Nursing. Religious and secular instruction. Situated on high moorland.

SUPPORTED BY VOLUNTARY CONTRIBUTIONS.

Payment 8s. 6d. weekly.

For further particulars apply to Miss Walker, Hon. Secretary, Fresh Air Department, 53, *Bryanston Street, London, W.*

ENGLAND AND WALES—*Continued.*

Place.	*Name and Address.*	*Terms per Week.*
TORQUAY ...	Mildmay Consumptive Home (for advanced cases only), Torquay.	10s. 6d., or 7s. with subscriber's letter.
	Western Hospital, Torquay.	7s. 6d. by nomination, 12s. 6d. without.
WAKEFIELD *(YORKS)*	Cardigan Sanatorium, Carr Gate, Wakefield, Yorks.	Maintained by the West Riding County Council for male patients receiving the "Sanatoria Benefits."
WINSLEY ...	Winsley Sanatorium, Near Bath.	
WOKINGHAM ...	The Pinewood Sanatorium, Pinewood, Wokingham.	3 guineas.
YELVERTON ...	Udal Torre Sanatorium, Yelverton, South Devon.	31s. 6d. to 42s.
WOLSINGHAM ...	Durham County Sanatorium, for women and children. Wolsingham, Co. Durham.	Free and by payment.

SCOTLAND.

ABERCHALDER *(INVERNESS)*	Inverness-shire Sanatorium, Aberchalder, N.B.	Free and by payment.
ABERFOYLE *(PERTHSHIRE)*	Children's Home Hospital.	
BANCHORY *(DEESIDE)*	Nordrach-on-Dee, Banchory.	5 guineas.
BRIDGE OF WEIR *(RENFREW)*	Consumption Sanatoria of Scotland, Bridge of Weir, Renfrewshire.	
COLINTON ...	Bonaly Cottage Sanatorium, Colinton, N.B.	
DUNDEE	Sidlaw Sanatorium, near Dundee.	
EDINBURGH ...	Royal Victoria Hospital for Consumption, Edinburgh.	Free; with a limited number of beds at £1 1s.
	Woodburn Sanatorium, Morningside, Edinburgh.	
GALASHIELS ...	Meigle Sanatorium, Galashiels, N.B.	
KINGUSSIE, N.B.	Grampian Sanatorium.	
KINROSS-SHIRE	Coppin's Green Sanatorium.	
KIRKINTILLOCH	Lanfine Home.	
LANARK	Bellefield Sanatorium, Lanark.	
MILNATHORT,	Ochil Hills Sanatorium, Kinross-shire.	
NEW CUMNOCK	Ayrshire Sanatorium, Glenaften, New Cumnock, Ayrshire.	
OBAN	Argyll County Sanatorium, Oban.	
PEEBLES... ...	Manor Valley Sanatorium, Peebles, N.B.	
PERTH	Barnhill Sanatorium, Perth, N.B.	

IRELAND.

DONERAILE ...	Cork County Sanatorium, Heatherside, Doneraile, co. Cork.	
DUBLIN ...	Larch Hill Sanatorium, Dublin.	
FORTBREDA ...	Forster Green Consumption and Chest Hospital, Fortbreda, Belfast.	Six beds free, others by small payment.
WARRENPOINT	Rostrevor Sanatorium, Warrenpoint, co. Down.	3 to 3½ guineas.
WICKLOW ...	Altadore Sanatorium, Kilpedder, Wicklow.	
	The Royal National Hospital for Consumption for Ireland, Wicklow.	Minimum, 7s., on subscriber's recommendation.

"Iodine is the only Anti-tuberculous Medicament having definitely proved *antitoxic* effects."

IODEOL

Colloidal electro-chemical Iodine

Pure and Stable (oily suspension)

NON-TOXIC. FREE FROM PEPTONES AND GLYCOGEN.

PAINLESS. 16 gr. per diem may be injected.

SAMPLES AND LITERATURE.

VIEL'S ELECTRIC COLLOIDS CO.,

118-122, HOLBORN, LONDON, E.C.

Extract of Meat

(SYRUP FORM).

Containing *Four times* more GLYCOGEN and more HÆMOGLOBIN and IRON than any other preparation.

Hipposarcine Roy

All danger of infection by tuberculosis so prevalent amongst oxen is effectually avoided.

Hipposarcine Roy

No preparation required. A most pleasant beverage immediately at hand by simply adding aerated mineral water.

Hipposarcine Roy

Original bottles and literature free.

M. BRESILLON & CO.,

Gamage Buildings,

Holborn, LONDON, E.C.

READY IMMEDIATELY. **Price 5s. net.**

HUMAN DERELICTS

A Collection of Medico-Sociological Studies for Teachers of Religion and Social Workers.

Edited by Dr. T. N. KELYNACK.

Foreword by SIR THOMAS CLOUSTON, M.D.

Contributors and Contents:

I. **Mental Derelicts.** ROBERT JONES, M.D., F.R.C.P.

II. **Idiots and Imbeciles.** F. R. PERCIVAL TAYLOR, M.D., B.S., M.R.C.S., L.R.C.P.

III. **Lunatics.** T. CLAYE SHAW, B.A., M.D., F.R.C.P.

IV. **The Feeble-Minded.** REGINALD L. LANGDON-DOWN, M.A., M.B., B.C., M.R.C.P.

V. **The Epileptic.** A. HUME GRIFFITH, M.D., D.P.H.

VI. **The Inebriate Derelict: The Problem in Relation to Women.** MARY L. GORDON, L.R.C.P., L.R.C.S.E., L.F.P. & S.G.

VII. **The Inebriate Derelict: The Problem in Relation to Men.** G. BASIL PRICE, M.D., M.R.C.P., D.P.H.

VIII. **The Criminal Derelict.** JAMES DEVON, M.D.

IX. **The Recidivist.** R. F. QUINTON, M.D.

X. **The Mentally Defective Criminal Derelict.** JAMES P. STURROCK, M.A., M.D.

XI. **The Vagrant.** CHARLES H. MELLAND, M.D., M.R.C.P.

XII. **The Prostitute.** HELEN M. WILSON, M.D.

XIII. **Senile Derelicts.** E. MUSGROVE WOODMAN, M.S., F.R.C.S.

XIV. **The Derelict Deaf.** C. A. ADAIR DIGHTON, M.B., Ch.B., F.R.C.S.E.

XV. **The Derelict Blind.** T. HERBERT BICKERTON, L.R.C.P.E., M.R.C.S.

XVI. **The Human Derelict: Pre-Natal Influences.** JOHN W. BALLANTYNE, M.D., F.R.C.P.E., F.R.S.E.

XVII. **Eugenics and the Human Derelict,** C. W. SALEEBY, M.D., F.R.S.E.

EXTRACT FROM PREFACE.

"THIS Book aims at providing all workers engaged in enterprises striving for human betterment with a concise and reliable presentation in non-technical language of such essential facts, guiding principles, and effective practices as are likely to be of assistance in the study and solution of those social problems which are directly related to the chief sections of morbid mankind

It is hoped that the book will find favour with those for whom it has been specially written, ministers of religion, parents, teachers, leaders of organizations dealing with adolescents, as well as social and religious workers. It is believed that the book will also be of some service to Medical Officers of Health and members of their staff, School Medical Officers, Tuberculosis Officers, Medical Members of the Poor Law and Prison Services, and others engaged in the various activities connected with national, medical, sociological, and medico-educational organization and administration. In order to make the work as helpful as possible to serious students and practical servants of the people, references have been appended to each chapter."

LONDON:

CHARLES H. KELLY, 25-35, CITY ROAD & 26, PATERNOSTER ROW, E.C.